



FRIDAY, AUGUST 21, 1903.

CONTENTS

ILLUSTRATED:

Shops of the Locomotive & Machine Company of Montreal	595
Fireproof Cars for the New York Subway	598
The Position and Protection of the Third Rail on Electric Railroads	598
Heavy Electric Locomotive for the B. & O.	599
Electric Lines in Northern New York State	600
German Locomotive Designs for High Speed Service	605
The Life of Treated Ties	606
The Hinchliffe Rail Joint	606
The Espen-Lucas Cold Saw Cutting-Off Machine	606

CONTRIBUTIONS:

Steel Track Highways	595
----------------------------	-----

EDITORIAL:

The Rock Island Company	602
Buffalo, Rochester & Pittsburgh	602
Rejection of the Panama Canal Treaty	603
Editorial Notes	602
New Publications	603
Trade Catalogues	603

MISCELLANEOUS:

Advance in Modern Steel Construction	595
Signaling Notes	599
Practical Forestry	605

GENERAL NEWS:

Technical	607
The Scrap Heap	608
Meetings and Announcements	608
Personal	608
Elections and Appointments	609
Locomotive Building	609
Car Building	609
Bridge Building	609
Railroad Construction	610
General Railroad News	610

Contributions

Steel Track Highways.

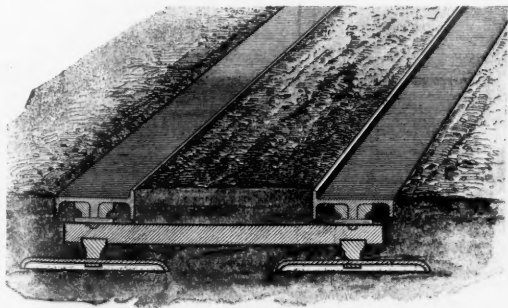
Camden, N. J.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The macadam road is a very great advance over the dirt or gravel road, yet to the thinking mind, the increased first cost of the macadam road and the great cost of maintenance and repairs, does not give to the farmer and general public that increased drawing capacity or speed which such an expensive construction should warrant.

Years of experiment, observations and deductions by the United States Road Experts, State Commissioners, and men prominent in highway construction, lead only to one conclusion, i. e., that highways as now built are expensive in first cost, and where used for heavy draughting are of comparatively short serviceable duration, and do not give that permanency of character or that increased greater drawing capacity or speed which such an expenditure should give. The reason is very simple and very soon told; broken stone has been used for the wheels to run upon, instead of metal.

Every observant person knows that broken stone under the continual grinding of the wheels soon becomes powder in dry weather and mud in wet weather, and both of these are detrimental to drawing a greater load, or increasing the speed of travel. Obviate these defects, by concentrating the rolling load on a broad flat faced



Steel Track Highway.

steel rail which is a permanent structure, and enable the farmer to trot with five or even ten tons of produce, instead of creeping along with a two ton load. General Martin Dodge, Director of United States Road Inquiry department, demonstrated at the Omaha exposition that 11 tons could be drawn by one horse with light harness with ease on the steel track, which took 20 horses to draw on common road.

As illustrated the pressed steel base plate is designed to give ample support to the track. On its face a hole is formed to receive the lug of the rail support. The lug of the rail support after passing through the hole, is one-quarter turned, which automatically locks them together and makes a rail support without cross ties. The transverse tie-rods are notched near each end to the gage re-

quired, and after passing through the mortises in the rail support, accurately gage the track, and prevent spreading and creeping. The tram rail is 8 in. wide and 30 ft. long, and each end of the rail is scarfed to engage longitudinally, making a series of breakjoints formed throughout the entire length of the track. The rail has a flange along its inner edge, designed to give greater vertical strength to the rail, and guide the wheels. The outer edge has a downward flange. The center downward rib is mortised at intervals to receive the wedge key, which locks all parts together, and is designed to engage in the groove of the rail support, and to give further additional vertical and lateral strength to the rail. The estimated cost of one mile of track is: Rails, base-plates, bars, up-rights and wedge keys, \$4,000; digging trenches and track-laying, \$600; broken stone 8 ft. wide, 4 in. deep, including labor, \$1,100; rolling stone, etc., cost per mile, \$5,700.

THOS. H. GIBBON.

Advance in Modern Steel Construction.*

Last year an Englishman came to this country to see how and why the Americans could outbid his countrymen on bridge work. His report was not the most reassuring for the English manufacturers. The discussion which followed the reading of his conclusions before a meeting of his colleagues on his return was, to say the least, amusing. One man did not believe in multiple drills because he had used them 30 years before and they had not been a success. One man said that our shops were not bridge shops but simply girder shops, etc., from which pieces were sent out to the field to be there assembled. Another did not believe in standardizing, etc.

This Englishman's conclusions were based upon close observation and calculations. His calculations showed that for seven years extending from 1895 to 1901, taking the Pencoyd shop as a model, that an American shop would show the following result: A draftsman would turn out an average of 770 tons per year, a templet maker 2,375 tons, a bridge shop worker 115 tons, a forge shop man 35 tons and an eyebar shop man 160 tons, whereas the English shops could show a result like 1,000 tons for a draftsman, 500 tons for templet maker and 20 to 30 tons for a bridge shop worker. This comparison showed two things, first that the English workman has his superior in the American, and second, that the English shop has its superior in the American because of the use of brain in planning the work more fully in the drafting room. An English draftsman will stand for more tonnage per year than an American, but the difference in the work turned out by the shops clearly shows that the work is better prepared when it reaches the workman.

American bridge and structural shops, including car and plate shops and other shops working up structural material, owe much of their large comparative output to the careful working out of their plans in the drafting office. They owe a large proportion of it, however, to the development of the machinery used in this class of work and also to the arrangement of shops for economical working.

We still have the small shop where one punch with shear attachment is almost the entire plant. Perhaps the rivets are driven by hand, or possibly by power of some kind. It is true also that work can be turned out as cheaply here as in a shop with all the modern improved machinery.

The old center punch remains and it will be many years before it is superseded, but its usefulness as a single punch has been improved upon. By means of a spacing attachment duplicates are punched more rapidly and without the aid of templets, without also the marking off necessary in single punch work. Gusset plates, clips, channels, miscellaneous and odd pieces all find their way to center punches after being laid off or marked off.

Shops doing special work of any amount adapt punches to this special work. In beam shops, punches, at one stroke, will punch 5, 8 or 10 or more holes in the end of a beam. In car shops, a press will be rigged up to punch numerous holes in a piece, for instance, a bolster or truck frame. In plate shops one end of a plate will be punched in 40 or 50 or even 60 places at one stroke, or both edges of the plate will be punched in one run through a rack punch with an even spacing. A bridge or structural shop will punch all column flanges and webs; all girders, flanges and webs (excepting of course any odd ones which creep in) on a multiple punch with an automatic spacing arrangement.

The modern shop has an evident superiority over the shops of years ago in its arrangement for the work for which it is intended. There is one arrangement for the bridge plant, another for a building shop, another for a beam shop, another for a plate shop, another for a car works, but all tending to the economical working of the plant. In the last few years in this vicinity a car works, a plate shop (otherwise perhaps a boiler shop but no boilers will be manufactured) have been built, and the largest bridge plant in the world is now in process of erection. These plants have all one point in common, and that is all important machines are direct connected either to steam engines or to motors. Sometimes groups of machines are operated by motors, but shafting is reduced to a minimum. They present this difference, whereas the car plant and the plate plant are longitudinally traversed by modern electric overhead traveling cranes;

*Extract from a paper read at June meeting of the Engineers' Society of Western Pennsylvania by L. F. W. Wildner.

the bridge shop will be traversed transversely by overhead electric trolleys.

The whole shop system is designed to save all unnecessary labor in rehandling material. The knowledge of this arrangement and of the tools for special work enable shop drawings to be made intelligently, enable the operating department to lay out its work of getting material into the shop and to the various machines, there to bring it together for assembling, riveting, planing, boring and painting and loading for shipment.

In the modern plant the special material, such as eye-bars, pins, upset rods, rivets, castings and bolts for bridges, castings and forgings for plate shop, axle-wheels, etc., for car work, are usually manufactured in shops devoted exclusively to one particular class of work. Thus the perfect bridge plant has its templet shop, its bridge department, an eyebar department, shops devoted to forgings, rivets and bolts, its machine shop, and more than likely its iron and steel foundry, storage buildings and of course a separate power house. The car plant has its departments for shearing, for pressing, punching, axle turning and erection, its own forge, machine shop, and even its own car wheel and malleable iron foundries. The plate plant has a department for rolling, punching and erection, with machine and forge shops.

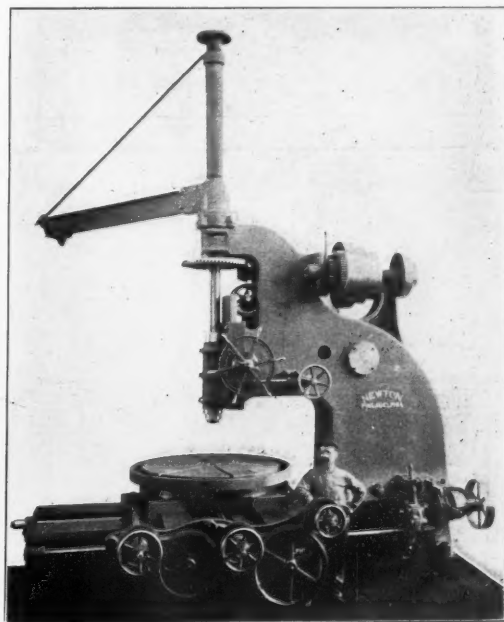
What the future of steel construction will be is hard to foretell. Concrete in its various forms of combination with steel has become a competitor along some lines, in foundations, short bridge spans, in tanks, in bins (grain and coal, etc.), stacks, and tile are being used in storage bins. There is, however, no cause for worry. Office buildings for many years to come will be of steel. Steel cars are here to stay. Railroads must and will replace bridges on all their lines. Electric roads have scarcely begun their development. Stand pipes, stacks, furnace shells, piping, flues, penstocks for hydraulic work, gas holders, mill buildings and other structures too numerous to mention are and will be of steel until we find a better substitute.

Shops of the Locomotive & Machine Company of Montreal.

The shops of the Locomotive & Machine Company of Montreal, Limited, will be completed by Sept. 1, 1903. The shops are located about two miles east of Montreal, on a strip of land between the St. Lawrence River and the Montreal Terminal Railroad. A large wharf and pier is to be built along the river so as to increase the shipping facilities. This will give a through water route to Europe as well as with the Great Lakes system of this continent.

The ultimate capacity of the works will be about 300 locomotives a year. The company will also do a general business in machine and structural work, steel buildings, bridges, roof trusses, etc.

All the steel work has been manufactured on the ground, and the design and erection has been under the direct supervision of Mr. M. J. Butler, Chief Engineer. A temporary shop containing the machinery for handling the structural material has been built. Most of the building material was bought in Europe. The duty rates were largely responsible for this, although the fact that



Vertical Milling Machine—Built by The Newton Machine Tool Works.

material could be obtained quickly was also a determining factor. The duty between the United States and Canada on steel shapes weighing less than 35 lbs. per yard is 35 cents per 100 lbs., and on shapes weighing 35 lbs. per yard or over, the duty is 10 per cent. of the value of the material. Between England and Canada there is a preferential duty one-third less than that above noted. It is also interesting to know that the duty between Canada and the United States is 60 cents per 100 lbs. on all sizes. These rates make it advantageous for Canadians to purchase raw material in England, and it also gives

Canadian builders a chance to compete with builders in other parts of the British Empire.

The plant consists of a machine shop about 420 ft. x 132 ft., a foundry 220 ft. x 65 ft. 5 in., a boiler shop 380 ft. x 67 ft., an erecting shop 340 ft. x 66 ft., a smith and forge shop 340 ft. x 66 ft., a two-story pattern shop 109 ft. x 63 ft., a pattern store house 109 ft. x 63 ft., and a power house 105 ft. x 71 ft. A structural shop about 310 ft. x 198 ft. is also to be built. It is also intended, at some future date, to build a steel castings shop. The general store house and offices are at the southern end of the grounds, as shown on the general lay-out.

The machine shop, boiler shop, foundry, erecting shop and smith shop are arranged in a group—the machine shop extending north and south, and the other shops connecting with it to the west. The machine shop is arranged so that the several departments are close to the shops from which the material is sent. For instance, the frame department is at the south end of the machine shop, close to the smith shop, and the cylinder department is at the north end of the shop close to the foundry. The power house has a central location.

A large reservoir is at the north end of the property and the drainage from the roofs of all the buildings flows into it. A 1,000-gal. pump, made by the Northey Manufacturing Company, Toronto, is in the engine house and furnishes the water supply to the several buildings—the suction pipe coming from the above mentioned reservoir. A Gould rotary pump having a capacity of 700 gallons a minute is placed near the St. Lawrence River and is run by a motor. In dry weather this pump draws water from the river and delivers it to the reservoir. Drinking water is obtained from an artesian well.

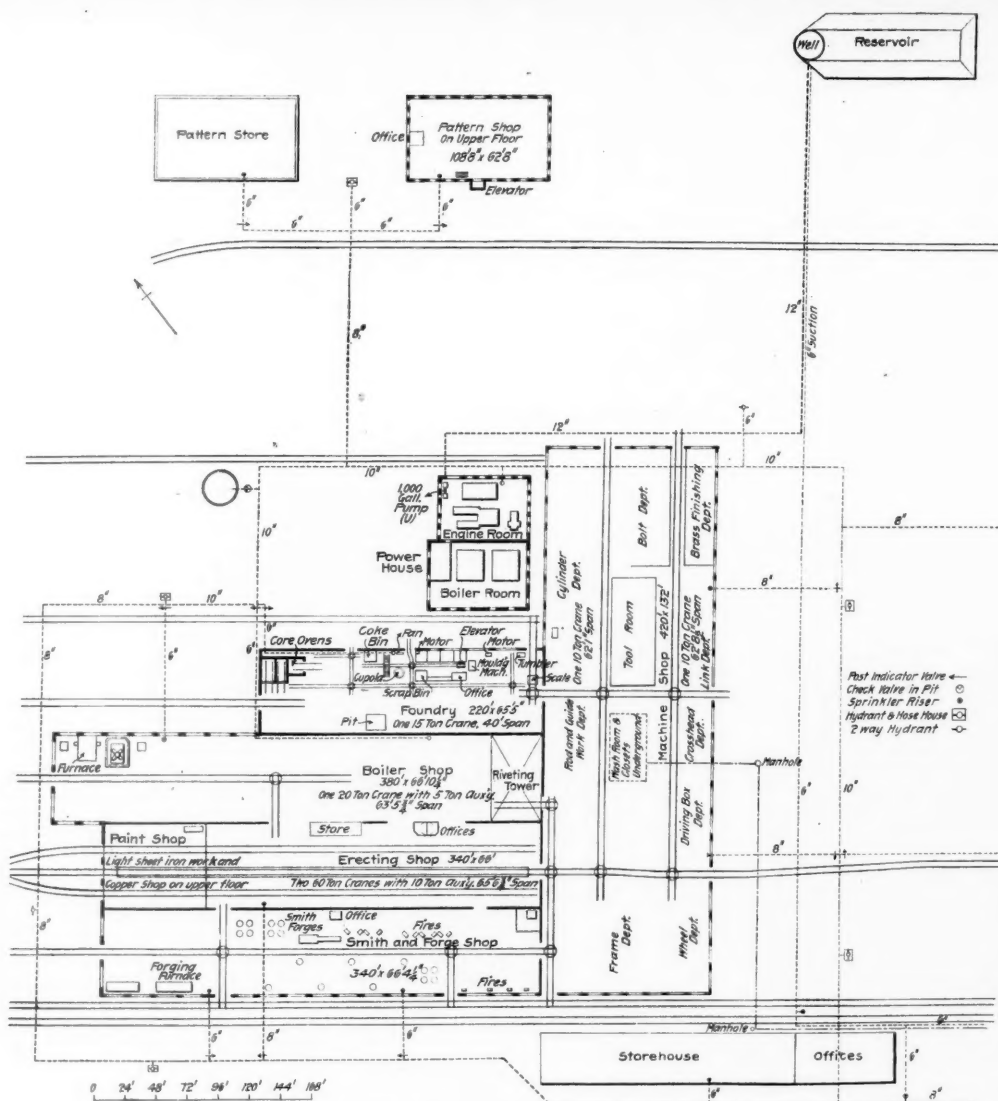
The area (in square feet) of the several principal buildings is given by the following table:

Machine shop	55,440
Erecting shop	22,440
Foundry	14,388
Boiler shop	25,460
Smith shop	22,440

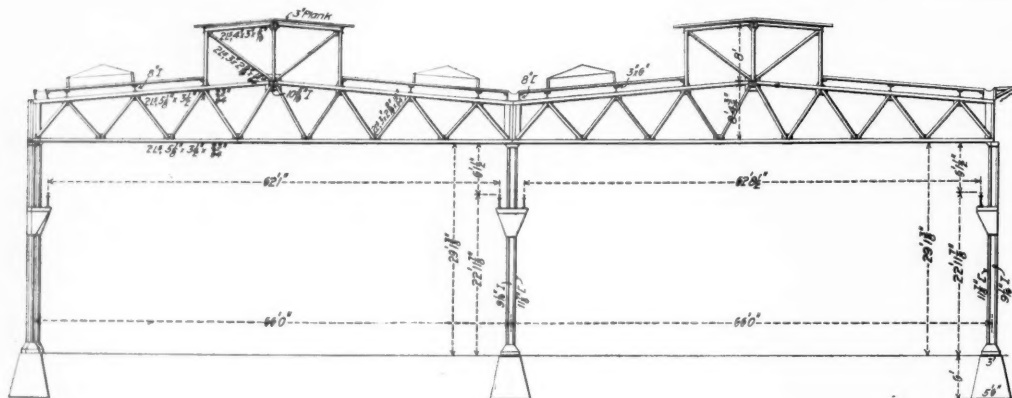
Total 140,168

The machine shop is by far the largest department, while the boiler shop is next in size. It will also be noted that the area of the erecting shop is relatively small. This large surplus of machine shop area was purposely provided, the feeling being that delays can usually be traced to the machine shop. A surplus of erecting pits is a useless expense unless the machine shop and other departments are able to furnish material as quickly as it can be assembled.

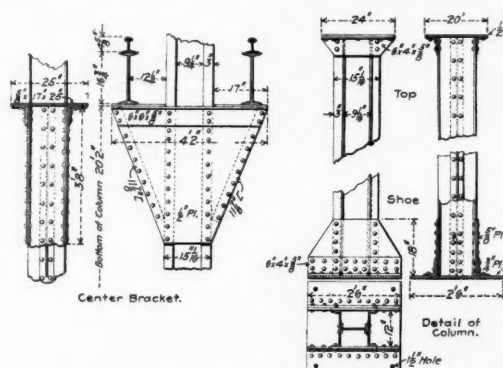
Power House.—The power house is divided into two parts by a 2 ft. partition wall. The boiler room is 50



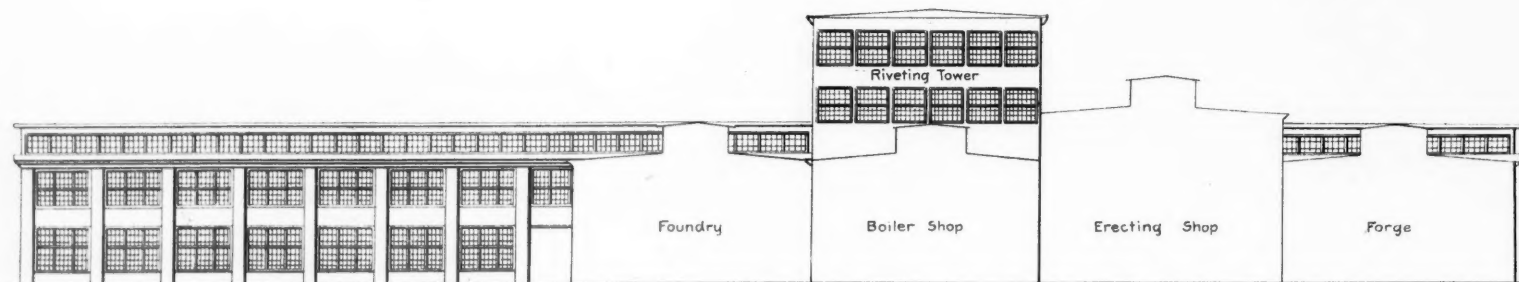
General Plan of Works—The Locomotive & Machine Co. of Montreal, Limited.



Cross Section of Machine Shop—Montreal Shops.



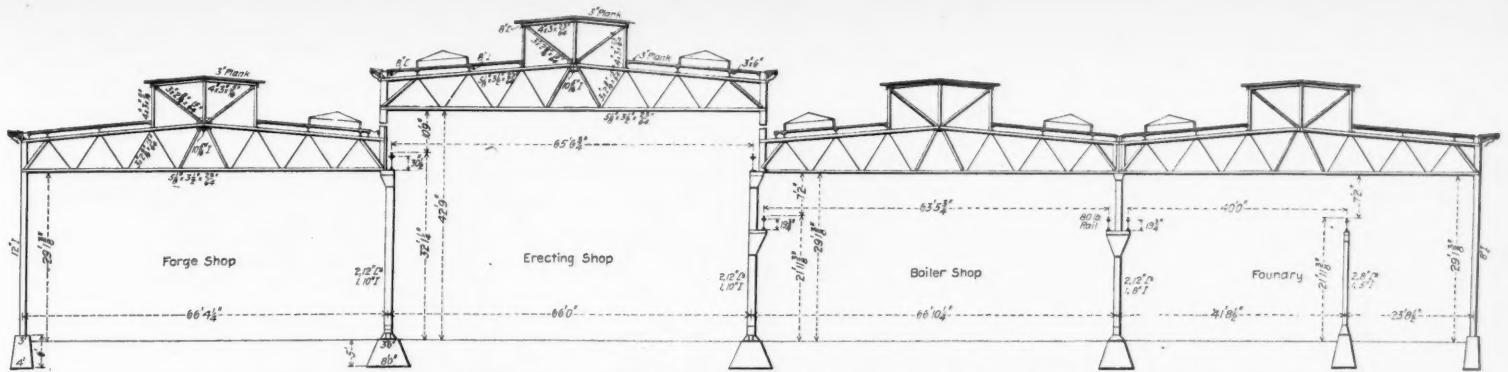
Detail of Crane Runway Supports in Machine Shop—Montreal Shops.



North Side Elevation of Machine Shop—Montreal Shops.

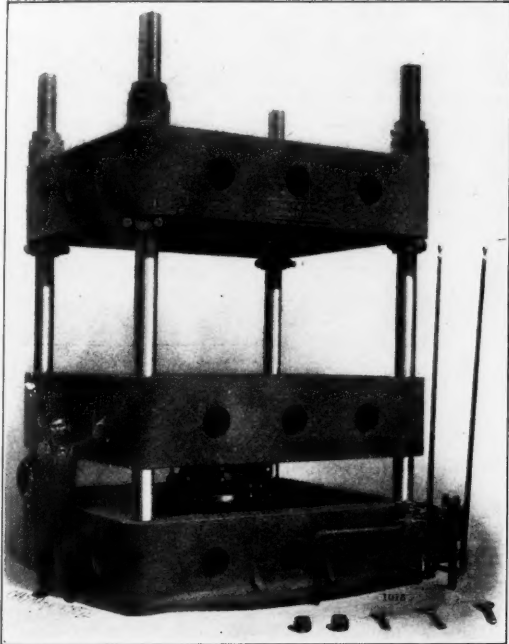


South Side Elevation of Machine Shop—Montreal Shops.



Cross Sections of Forge, Erecting and Boiler Shops and Foundry—Montreal Shops.

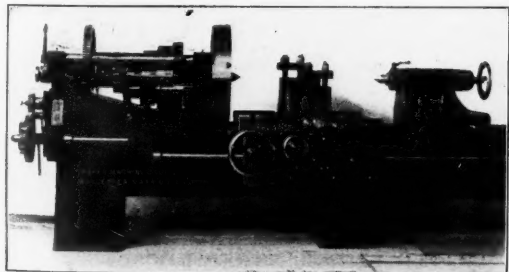
ft. x 74½ ft. inside, and the engine room is 49 ft. x 67 ft. The boiler room contains four 250 h.p. Babcock & Wilcox boilers, set in two batteries of two each. The boilers are fitted with the Jones underfeed stokers, and the Sturtevant induced draft system is used. The boilers



450-Ton Hydraulic Press—Built by the Bement-Miles Co.

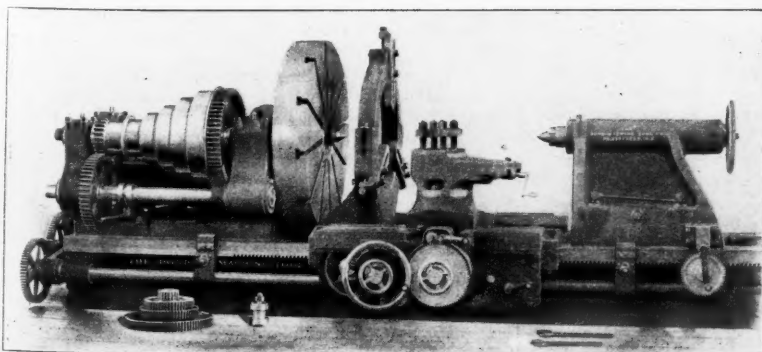
were made in Glasgow, Scotland. They are designed to operate at 200 lbs. pressure and are provided with Babcock & Wilcox superheaters which deliver steam at a temperature of about 450 deg. F.

The engine room contains one 18 in. and 34 in. x 42 in. Corliss compound condensing engine made by the Laurie Engine Co., Montreal. It is belted to a 400 k.w. direct current generator made by the Western Electric Com-

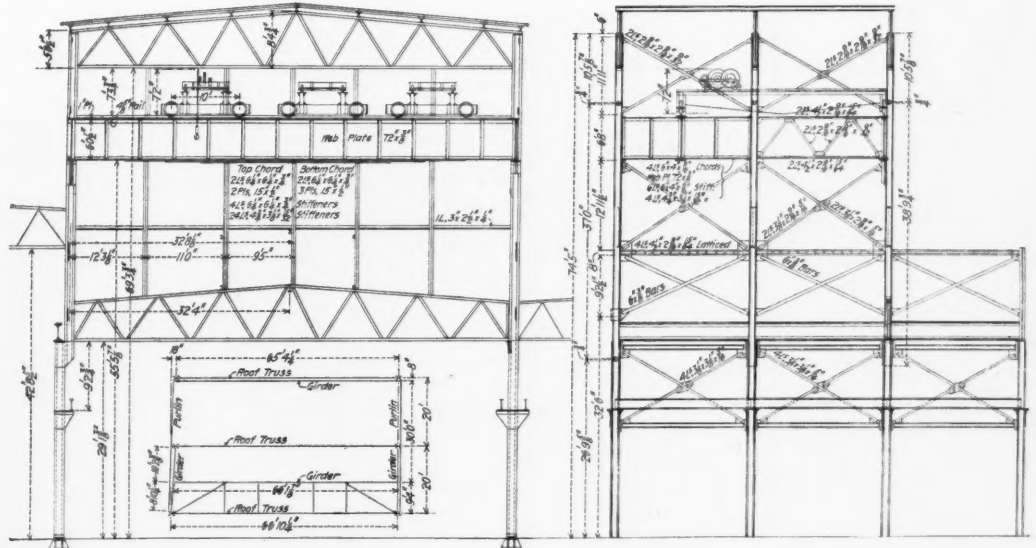


24-in. Crank Pin Lathe—Built by The Draper Machine Tool Co.

pany. The three-wire system is used, giving two voltages of 110 and 220 respectively. Surplus power is supplied by the Montreal Light, Heat & Power Co., and a motor generator set has been installed in the engine room for



54-in. Lathe—Built by The Pond Machine Tool Co.



Riveting Tower—Montreal Shops.

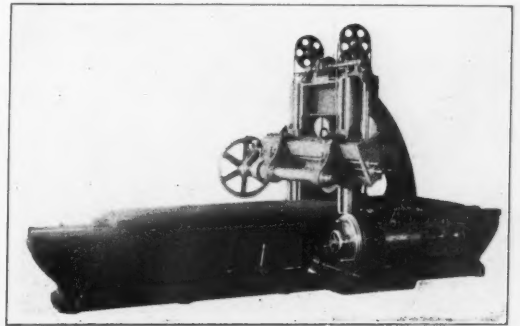
transforming and stepping down the high potential a.c. current from the power company's line. Two air compressors will be installed, both being furnished by the Rand Drill Company, New York. They will have capacities of 2,000 ft. and 1,250 ft. a minute respectively.

Machine Shop.—The machine shop is 420 ft. long and is divided longitudinally into two bays, each 66 ft. wide. The clear height under the roof trusses is about 29 ft. The trusses are 8 ft. 4¼ in. deep at the center. The roof of each bay is surmounted by a monitor running the length of the shop. Additional overhead lighting is obtained from skylights placed at intervals in the roof. Each bay is traversed by a 10-ton electric traveling crane, having a span of 62 ft. 8½ in. The crane runways are supported on brackets riveted to the supporting columns. The general design of the steel work for all the buildings is practically the same. In addition to the traveling crane, there are about 26 jib cranes, with air hoists distributed throughout the shop. The capacity of these hoists range from 1,500 lbs. to 8,000 lbs.

Foundry.—The foundry is 220 ft. x 65 ft. 5 in. A 15-ton crane having a span of 40 ft. serves the molding floor. The inside runway of this crane is supported on steel columns. The cupola was furnished by the Whiting Foundry Equipment Company, Chicago. Air blast is supplied from a structural steel pressure blower running at a maximum speed of 1,900 r.p.m. The blower is driven by a 60 h.p. motor, running at 675 r.p.m. The brass foundry is at the east end of the building on the second floor.

Boiler Shop.—The boiler shop is 380 ft. x 66 ft. 10¼ in., and is served by a 20-ton electric traveling crane having a five-ton auxiliary hoist. The span of the crane is 63 ft. 5¼ in. The riveting tower is at the east end of the shop and is shown

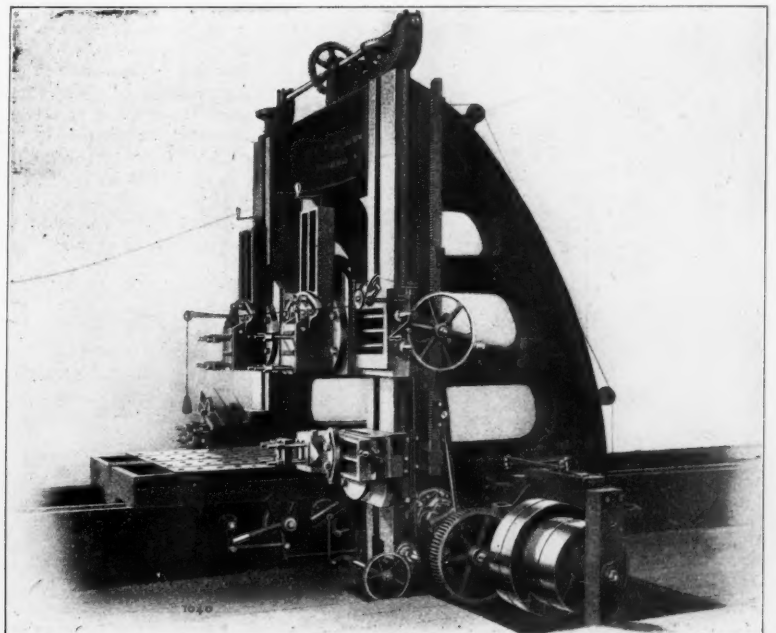
herewith in detail. The hydraulic accumulator was built by the Niles-Bement-Pond Company and has a 12-in. piston and a stroke of 16 ft. The working pressure is



30-in. Milling Machine—Built by The Ingersoll Milling Machine Co.

1,500 lbs. per sq. in. A photograph of this machine is shown on the next page.

Erecting Shop.—The erecting shop is 340 ft. x 60 ft., and has one longitudinal pit in the center running nearly the length of the shop. The bottom of the pit is crowned



84-in. Planer—Built by The Pond Machine Tool Co.

and is 2 ft. deep at the center. The rails rest on 10-in. x 10-in. timber sleepers. Standard gage tracks run along each side of the erecting pit. The paint shop is on an elevated floor at the east end of the building. The shop is served by two 60-ton electric traveling cranes having each a span of 65 ft. 6 $\frac{3}{4}$ in. The general details of the steel work are the same as those of the other shops except that the clear height under the trusses is 42 ft. 9 in.

Smith and Forge Shop.—This shop is 340 ft. x 66 ft. 4 $\frac{1}{2}$ in. The shop is not provided with a traveling crane but has a liberal supply of air hoist jib cranes which cover practically the entire floor area.

There are altogether about 100 Westinghouse motors throughout the shops, ranging from 5 to 60 h.p. All lathes and small tools are arranged in groups approximating 20 h.p. each. All large and isolated tools have an individual motor drive.

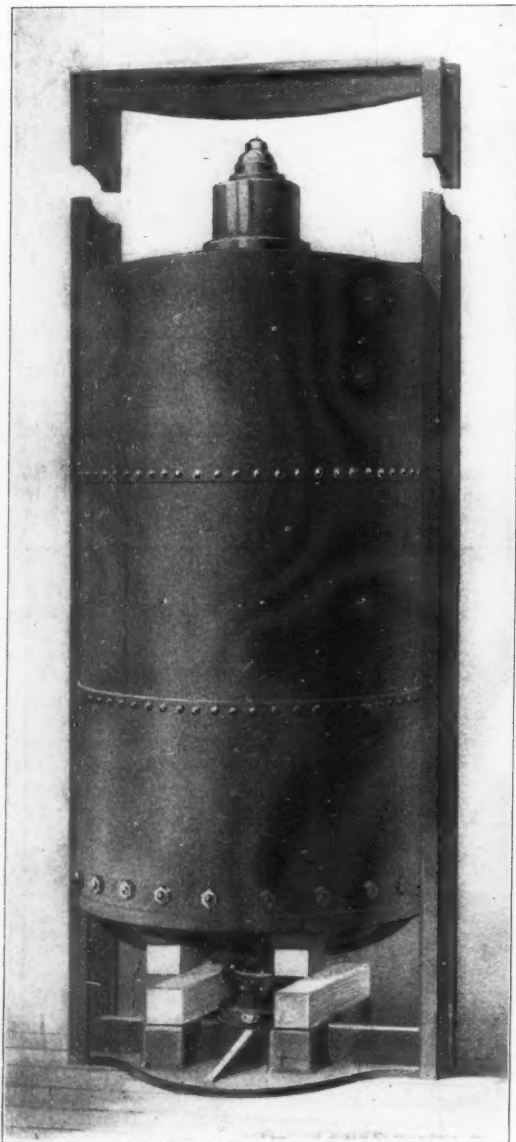
There are a number of interesting tools being furnished these shops, some of which are shown herewith. The 84-in. x 84-in. x 36-in. Pond planer is arranged to have a 32 h.p. motor mounted on top of the housing.

The 24-in. Draper crank-pin lathe weighs about 7,250 lbs. Both the back gear and triple gear are at the front of the lathe, thus bringing all stresses on the bottom of the bearings. The ratio of back gearing is 8.52, and the ratio of the triple gearing to the face plate is 31.8. The carriage is 34 in. long and has two plain block rests, with clamping bolts for the tools. Each rest has a separate cross feed, operated either by hand or power, thus enabling the operator to cut both from the back and front of the work, each cut supporting the other.

Another interesting machine is the large vertical miller furnished by the Newton Machine Tool Works, Philadelphia. It is claimed to be the largest vertical milling machine ever built for locomotive work, and is intended mainly for the guide yoke work. A stack of guide yokes can be clamped on this table and finished without resetting. The crane which is provided swings on the center of the spindle. The carriage of the machine is 60 in. in diameter over tee slots. The machine will admit work 24 in. high and the carriages have a cross feed of 65 in., and an in-and-out feed of 50 in. The spindle is counter-weighted and can be quickly adjusted. The shipping weight of the machine is about 60,000 lbs.

The heating apparatus of the shops is to be installed by the B. F. Sturtevant Company, Boston. The fans are in a wing to the machine shop. The air is delivered to underground ducts and the discharge pipes have three openings discharging upward and along the sides of the walls respectively.

The company is capitalized at \$1,000,000 and has the



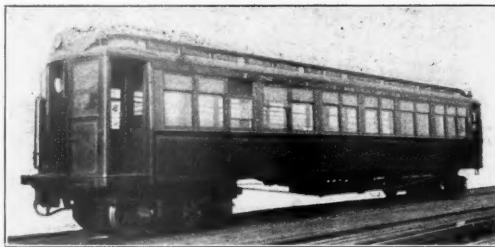
12-in. x 16-ft. Hydraulic Accumulator—Built by The Niles-Dement-Pond Co.

following officers: M. J. Haney, President; J. T. Davis, Vice-President and General Manager; R. T. Shea, General Superintendent; M. J. Butler, Chief Engineer, and D. Shirrell, Mechanical Engineer.

We are indebted to Mr. R. T. Shea, General Superintendent, for the details of the above description.

Fireproof Cars for the New York Subway.

In connection with the frightful accident on the Paris Metropolitan, it is interesting to note the steps which the Interborough Rapid Transit Company of New York has already taken to avoid similar accidents. The trouble in Paris lay in the fact that the cars, which were built of wood, were not fireproof, so that when the motors went wrong the cars caught fire. The Interborough Company has recently ordered 500 cars from the Wason Manufacturing Company, and several of these have already been completed. To the casual observer these cars are similar to those in use on the elevated lines, but the sides of the car body are of copper sheathed hardwood, lacquered to avoid discoloring. Above the window sills the sides are painted a reddish color. This



Car for Interborough.

use of copper is a new departure for electric roads, but it has already been tried successfully on the cars of several steam railroads. The arrangement of the cars inside is similar to that used on the elevated, with rows of seats on either side, divided into two sections by the eight cross seats in the center. The floor of these cars has been built with extreme care, as it is here that the fire is most likely to start through some defect in insulation. The bottom layer nearest the machinery is made of asbestos one-fourth of an inch thick. Next to this is a layer of wood, followed by a layer of fireproof felt; then a maple floor, with asbestos lining and a top layer of wood 1 in. thick. Such a construction will doubtless prevent the spread of fires originating in the motors or in the controller mechanism under the car.

The Position and Protection of the Third Rail on Electric Railroads.*

BY WILLIAM E. LANGDON.

In view of the fact that modern arrangements now propose to provide a "return" rail, independent of the track or wheel-rails, it would, perhaps, have been more correct if the title of this paper had been "the position and protection of the conductor rails." It will, however, I hope, be quite understood that the consideration of the subject embraces the provision of both the third and fourth rail.

By the third rail is meant that rail which conveys the current to the motor, and by the fourth, that which returns it to the generator; and in order to avoid confusion of terms it is hoped it may be found convenient to regard the rails which carry the traffic as the *wheel-rails*, and those which convey the electric current as the *conductor-rails*.

There is ample evidence that we have now arrived at a period when surface lines of railroad—lines of ordinary construction for steam haulage—have to be considered in relation to their operation by electrical agency. Tube lines will, no doubt, where they have means for doing so, form connection with near surface-lines for the purpose of ready interchange of traffic. And when to this we add that it is understood all of the main lines are considering the propriety of electrically working portions of their systems, the question of arriving at a decision as to the position of the conductor-rail, is in the interest of all, most desirable; for, whether the equipment of trunk-lines is, for a long or a short time, deferred, there can be little doubt that what may be termed the residential lines will seek to avail themselves of the advantages to be obtained from electric traction; and, as many of these may intersect one another, a recognized standard will become an absolute necessity.

There appears to be no uniformity of practice in determining the position of the conductor-rail. This, so far as this country (England) is concerned, is probably to be accounted for by the fact that the progress of electrically-driven railroads has been mainly confined to underground routes, the only exception being that of the Liverpool Overhead Railway, a line which, although exposed or open to climatic influences, is inaccessible to trespassers, and free from other inconveniences common to the ordinary surface railroad.

The practice with the earlier lines operated by electricity, has been to lay the third rail between the wheel-rails and to employ the wheel-rails, duly bonded, to form the return conductor. For the Mersey Tunnel, the Metro-

politan District, Metropolitan, and other electrical lines, in contemplation or under construction, an insulated rail is used for the "return." The potential conductor is placed at a given distance outside the wheel-rails, and the return-rail between them. It is considered that this practice, viz., the provision of an insulated, or at all events, of an independent, return-rail, will be found in future constructions. The object in thus employing conductors independent of the wheel-metals will be obvious. It avoids any interference therewith, and insures, as far as possible, perfect continuity. It will also be helpful in preventing trouble with the telegraph service.

In all instances the conductors are, whether insulated or not, laid upon the sleepers which serve the wheel-rails, and this appears to be the practice in America as well as here; but in the States, where the sleeper employed is not so long as those used in this country, every fifth one, or thereabout, is made longer for the purpose of providing for the support for the third rail. By the courtesy of the British Westinghouse Company I am enabled to furnish the appended details of the position of the conductor in relation to the wheel-rail on lines in the United States, as also a scale drawing, Fig. 1, showing the position of the positive and negative conductor-rails as adopted by that company.

From this list and from other data it is clear that the only uniformity attained is that all alike make use of the sleepers which carry the wheel-rails for the support of the conductor-rail or rails, as the case may be. The object, no doubt, is to secure parallel conditions between the different sets of rails.

Protection of Conductor-rail.—There is, of course, no absolute necessity for the protection of the return conductor; but for the third rail, viz., that which forms the potential conductor, protection is desirable, and has in some instances been provided. This protection usually

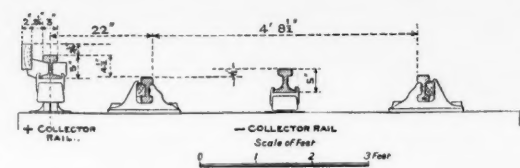


Fig. 1.

consists of a vertically-arranged plank on one or both sides of the rail, as shown on one side only in Fig. 1, the upper edge of the plank being somewhat higher than the top surface of the rail, so that anything falling across it may not form contact with the conductor.

It is suggested that this affords no protection from the weather, and but an imperfect protection against accidental contact. The conditions that will attend surface-lines are very different from those which apply to tube-lines, or lines which are not open to trespassers. Climatic conditions will be found to be far more troublesome. Snow, rain and fog are enemies which have little, if any, effect upon a covered line. It would therefore appear desirable that the most complete protection of the conductor-rail, both with respect to climatic effect and accidental

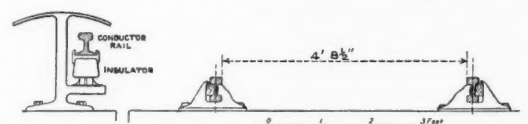


Fig. 2.

or intentional interference, should be provided for. This, it is thought, may be better obtained by adopting a roof-cover as shown in Fig. 2: the roof extending so far beyond a vertical line drawn from the edge of the rail as would prevent a person standing against it, or an implement placed against it, from touching the conductor. We have to bear in mind that workmen will, in the discharge of their duties, be frequently moving about in the immediate neighborhood of the conductor, and that such a guard as that suggested would unquestionably be more effectual than the vertical planks which leave the top of the rail exposed.

Points for Consideration.—Two important questions present themselves, viz.: (1) The distance which should intervene between the near wheel-rail and the conductor, or between the latter and the return rail; and (2) Whether the sleepers which carry the wheel-rails should be used for the conductor-rails.

It is probable that the first of these two important questions will only be determined after experience of the climatic effects to which they will be exposed has been obtained.

With respect to the second question, however, the subject can at once be considered, and no better opportunity than the present could arise, when it may be expected that engineers of permanent-way are present.

In considering it we have to bear in mind: (a) that the permanent-way must be constantly patrolled; (b) that packing and drainage of the sleepers are essentially an everyday occurrence; (c) that renewals of sleepers and rails, replacement of defective sleepers, broken chairs, etc., must be provided for; (d) that when laying out stores for any of these works the off-side of the line is almost invariably used; (e) that the off-side of the line is also used by workmen and others when walking the line.

All these conditions, it is thought, suggest the propriety

*Extracts from a paper read before the Institution of Civil Engineers, London, at the Engineering Conference, June, 1903.

of confining the conductor-rails to the "six-foot," and dissociating them entirely from the sleepers which carry the wheel-rails. This would, inasmuch as structures would at points narrow the space, and for other reasons, necessitate the use of a flexible collector, which ought not, however, to prove an insurmountable obstacle.

It would also entail, where a fourth rail is employed, the provision in the 6-ft. space of a structure which would accommodate both the potential and the return-rail, either vertically, one above the other, or on practically the same level—side by side. It is evident this would prove more complicated than the provision shown in Fig. 1, but it is also clear that it would be largely to

Heavy Electric Locomotive for the B. & O.

The most powerful electric locomotive in the world has just been built by the General Electric Company at Schenectady, for the Baltimore & Ohio for use in the tunnel at Baltimore. It will handle all the freight traffic of the B. & O. which passes through Baltimore and will operate over the same section as the present electrical locomotives built by the General Electric Company and which have been in successful operation for the past eight years. (See *Railroad Gazette*, p. 735, 1895.)

The specifications called for an electric locomotive capable of handling a 1,500 ton train, including the steam

jury. The end pieces form the buffer beams and to these a suitable standard draft gear of approved design is attached.

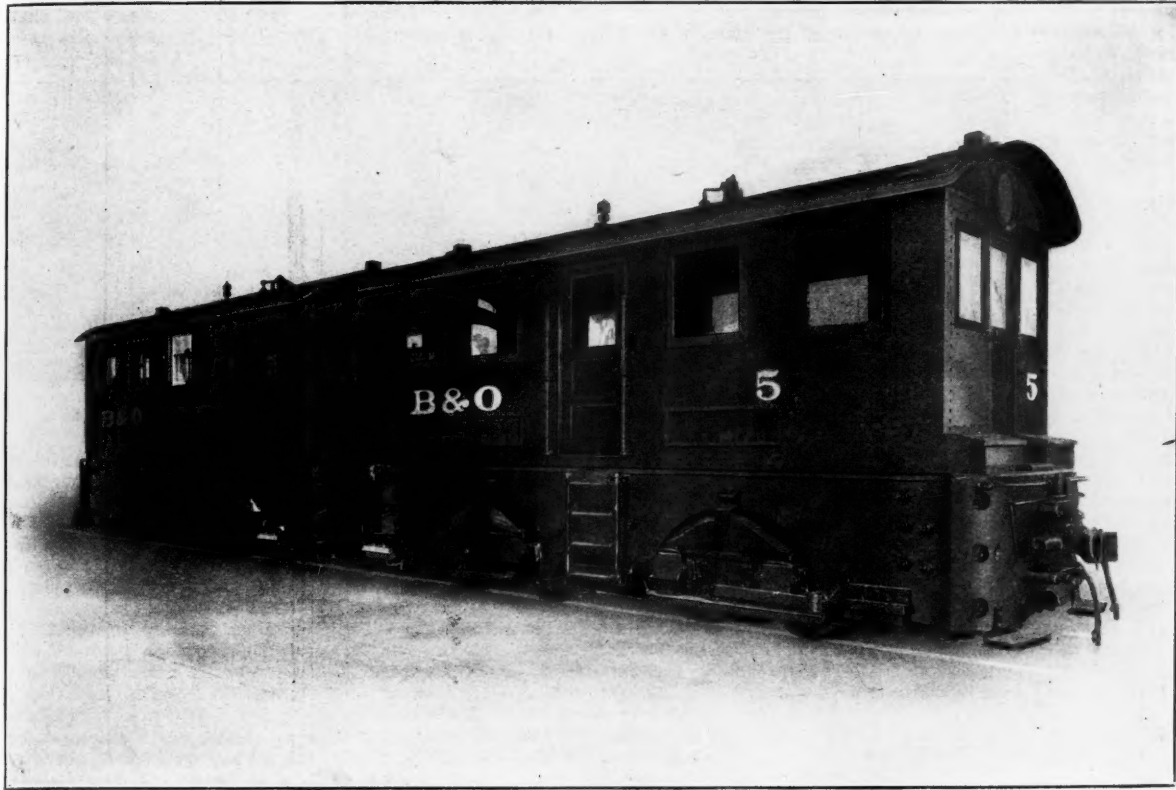
The journal boxes slide in machined jaws in the side frames protected by wearing shoes. The truck frames are supported at four points on equalizers. Each equalizer rests on a pair of half elliptic springs, the ends of which are supported on top of the journal boxes through suitable wearing plates.

The journal boxes are made quite similar to standard car journal boxes, the parts, however, being made larger and stronger. The brasses can be easily removed and by dropping down the wearing shoes it is possible to remove a complete journal box without removing the wheels and axles or other parts of the truck. In order that the locomotive may round curves easily, the axles are given considerable lateral movement in the journal boxes, reducing the effective rigid wheel base.

The steel-tired spoked wheels have tires 2 7/8 in. thick with M. C. B. standard tread and flange and are securely held in place by approved fastenings. The axles are made of forged steel machined all over with 6 in. x 12 in. journals, 8 in. diameter wheel fit and 7 1/2 in. diameter motor bearings. The cab is large and roomy, with the floor resting on the truck frame. The lining floor is made of 1 3/4 in. hard pine tongued and grooved, the upper floor of hard pine 3/4 in. thick, tongued and grooved and laid in the opposite direction from the lining floor. The sides and roof of the cab are made of sheet steel. On each side there is an entrance door, and at each end there is an additional door which permits of ready communication between sections when coupled together. Large windows afford an unobstructed view in all directions.

The controlling apparatus consisting of master controller, engineer's valves, etc., is in duplicate, a complete set being located in diagonally opposite corners of each cab so that the engineer can stand in the front end of the locomotive when running in either direction.

Each section of the locomotive is equipped with a bell and whistle, two locomotive head lights, air-brake apparatus, including two engineer's valves and air gauges, the necessary brake cylinders, foundation brake gear, air reservoirs, couplers, draft gear, and Leach pneumatic track sanders. The control system is so arranged that each section may be operated independently or two or more sections coupled together.



160 Ton Electric Locomotive for the B. & O.—Built by The General Electric Co.

the convenience of the electrical as well as the permanent-way engineer, and that it would aid each in the effectual maintenance of their respective responsibilities.

It would also claim consideration in dealing with crossings. With a multiple-unit train no trouble would arise, but with a train worked by a locomotive it would be necessary to supplement the collectors on the locomotive by collectors on the next vehicle, which would ordinarily be the guard's van or break.

PLANTS ALREADY INSTALLED.

The following table gives the location of the positive collector-rail where electric traction has already been installed on a number of main-line steam railroads, and inter-urban, elevated, and underground electric railroads.

Name of railway.	Top of positive rail to top of track rail.	Track gage-line to center of positive rail.
	Inches.	Inches.
<i>Main-Line Railways, Electric and Steam Service.</i>		
Balt. & Ohio., Balt., Maryland (old location)	1 3/4	24
Balt. & Ohio., Balt., Maryland (new location)	3 1/2	30
New York, New Haven & Hartford.....	1 1/2	Center
Paris-Orleans Ry., France.....	7 3/4	25 3/4
Gallaratae, Italy	7 1/2	26 3/4
Mersey Ry., Liverpool.....	4 1/2	22
North-Eastern Ry., Newcastle
Lancashire & Yorkshire Ry., Liverpool.....
<i>Inter-Urban Railways, Electric Service only.</i>		
Albany & Hudson, New York.....	6	27
Aurora, Elgin & Chicago, Illinois.....	6 5/16	20 1/4
Columbus, Buck. Lake & Newark, Ohio.....	6	27
Columbus, London & Springfield, Ohio.....	6	27
Lackawanna & Wyoming Valley, Pa.....	6	20 3/4
Grand Haven, G'd Rapids & Muskegon, Mich.	6	20 3/4
<i>Elevated and Underground Electric Rys.</i>		
Metropolitan West Side Elevated, Chicago..	6 1/4	20 1/4
Lake Street Elevated, Chicago.....	6 1/2	20 1/4
South Side Elevated Railway, Chicago.....	6 3/4	20 1/4
North Western Elevated Railway, Chicago..	6 1/2	20 1/4
Brooklyn Elevated Railway.....	6	22
King's County Elevated Railway, Brooklyn.	5 1/4	19 1/2
Manhattan Railway, New York.....	7 1/2	20 3/4
Rapid Transit Subway, New York.....	4 1/2	22
Central London Railway.....	1 1/2	Center
Liverpool Overhead Railway	1 1/2	Center

It will be noted that there is a wide variation in the dimensions, but in general the main line steam railroads of America and the Continent have found it necessary to place the rail at a greater distance than 24 in. from the gage line. This is due to the width of steam locomotives and heavy goods cars, and to the specially long and low double-bogie stock for transporting bulky apparatus and machinery, such as car bodies, flywheels, generator frames, etc.

locomotive, but excluding the electric locomotive on a maximum grade of 1 1/2 per cent. at 10 m.p.h., with corresponding higher speed on lighter grades. This required a weight of approximately 160 tons on the drivers for purposes of adhesion, and it was decided that the most practicable scheme was to build an articulated locomotive consisting of two complete 80-ton units operated together as one locomotive by means of the Sprague-General electric multiple unit control system.

The section of the road to be operated runs from Camden street station through the tunnel to the summit of the grade outside the tunnel a distance of 3 1/2 miles. Under practical operating conditions the motors have sufficient capacity to maintain this service hourly, running loaded up the grade and returning light.

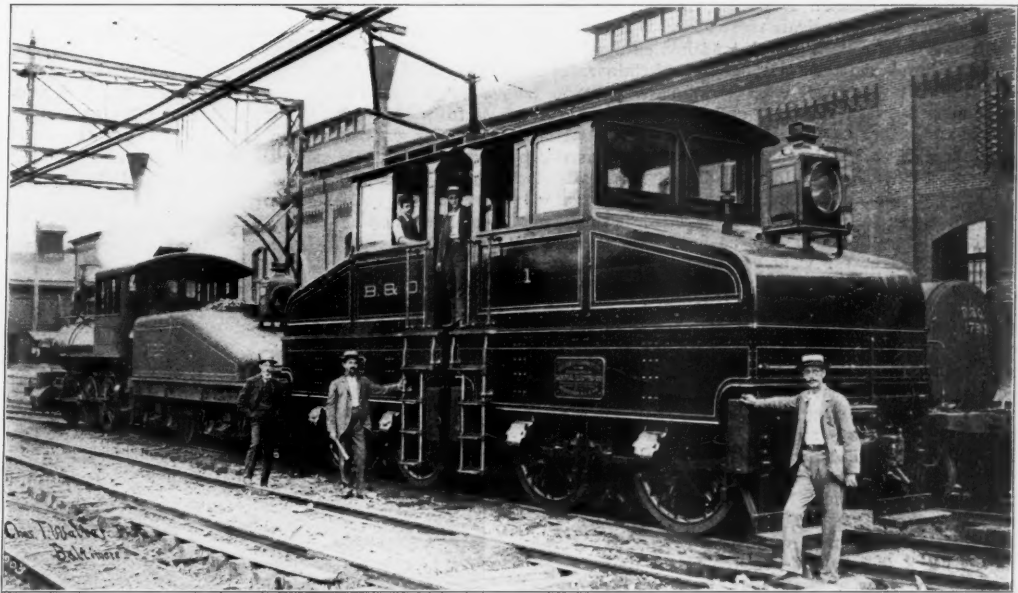
The whole locomotive consists of eight G. E. 65 motors, four on each section. These motors have a capacity of 225 h.p. each, making a total capacity of 1,800 h.p. The main body of the truck frame consists of a rectangular frame work of cast steel built up of four pieces, two side frames and two end frames, made strong and heavy. The parts are machined at the ends and securely fitted and bolted together, forming a strong and rigid structure capable of withstanding the most severe shocks without in-

Signaling Notes.

The Nashville, Chattanooga & St. Louis is to introduce the block system (manual) on its line between Chattanooga, Tenn., and Stevenson, Ala., 40 miles. Block stations will be established at Stevenson, Bolivar, Bridgeport, Carpenter, Shellmound, Vulcan, Whiteside, Summit, Hooker and Wauhatchie. There are already stations at Lookout, Cravens and Chattanooga. The sections will average about three miles in length. The company already had its line blocked from Wauhatchie into Chattanooga, a distance of eight miles.

The construction forces of the Delaware, Lackawanna & Western are now putting up automatic block signals on the main line between Wayland, N. Y., and Linwood, about 35 miles.

The New York Central & Hudson River is to put in an interlocking plant at South Schenectady, N. Y.



80 Ton Electric Locomotive for the B. & O.—In Use Since 1895.

Electric Lines in Northern New York State.

In an article printed in the *Railroad Gazette* May 23, 1902, a description was given of the interurban electric lines centering at Albany, N. Y., viewed as competitors of the steam roads which they paralleled, and especial attention was paid at that time to the express and light freight traffic which had been developed. The competitive lines in the Albany district were mentioned as being the Albany & Hudson, a third rail line between the points named, 35 miles; the Hudson Valley, running north from Albany and Troy to Glens Falls and Warrensburg; and the Albany & Schenectady, a highway line which had absorbed practically all the local business between Albany and Schenectady, 14 miles. The electric railroads in the Cleveland district and in the eastern part of Massachusetts have also been reviewed in recent issues, and the present article is a continuation of the series, dealing with the territory between Albany and Buffalo, where there are several interurban lines which have had a marked effect on steam traffic and which have developed certain conditions different from those previously discussed.

At present there is no such thing as a chain or through route of electric lines west from Albany to Buffalo. The subject has been a favorite one with newspaper writers, who connect lines built with lines contemplated and show the trunk lines to the West thus produced. There is considerable likelihood that within five or ten years such a trunk line will actually exist for a good part of the distance between Albany, Buffalo and Cleveland, but its influence on through traffic between the points named may safely be disregarded. Judging from traffic results on the Cleveland-Detroit route, which was coupled up and then uncoupled again because the separate units involved were more profitable than the through route, the maximum long haul which is going to afford any real returns to the electric lines is not likely to be much over 40 miles, although sleeping car routes will doubtless be extended and a certain amount of night business secured by the electric lines. But it is the 15 mile haul and the 25 mile haul with which interurban lines of the present era are most concerned and which are having the greatest effect on the steam roads paralleled. In the present article, therefore, the lines building or projected in this territory will be omitted, since owing to similarity of traffic conditions their results can be approximated by some of the characteristic lines now in existence.

West of Schenectady, the three competitive points at present are Utica, Syracuse and Rochester. From Utica

the interurban business of electric lines, for the reason that the electric hauls within the towns and cities on the route are not differentiated from the through traffic. Through the courtesy of the management of the Utica & Mohawk Valley, however, we are enabled to show the amount of business done between Utica Park, at the east end of town, and Little Falls; between Whitesboro, at the west end of town, and Rome; and between New Hartford, on the south of the city, and Clinton, thus omitting the large business done in the city of Utica. For the three months ending August 1 of the current year, gross earnings between Utica Park and Little Falls were \$58,358; from Whitesboro and Rome they were \$20,867; and from New Hartford to Clinton \$6,960. In view of the fact that this compilation, in certain cases, begins co-incidentally with the opening of the route, it will be seen that

territory through which they themselves and the steam roads jointly run, thus increasing the number of possible passengers. It has been roughly estimated that the traffic between competitive main-line points on the steam road falls off something like 65 per cent. when the competition first starts, but that the returns, as augmented by new long haul traffic, recover quite quickly to normal, with the difference that the new traffic is of a kind more profitable for a steam road to transport than was the old kind.

The line to Clinton, which is laid along the highway and is single track but in first class condition beyond the city limits, gets probably 95 per cent. of the passenger traffic between these points. It is inevitable, however, that in a suburban run as short as nine miles a good electric service will secure all the traffic, provided it picks its pas-



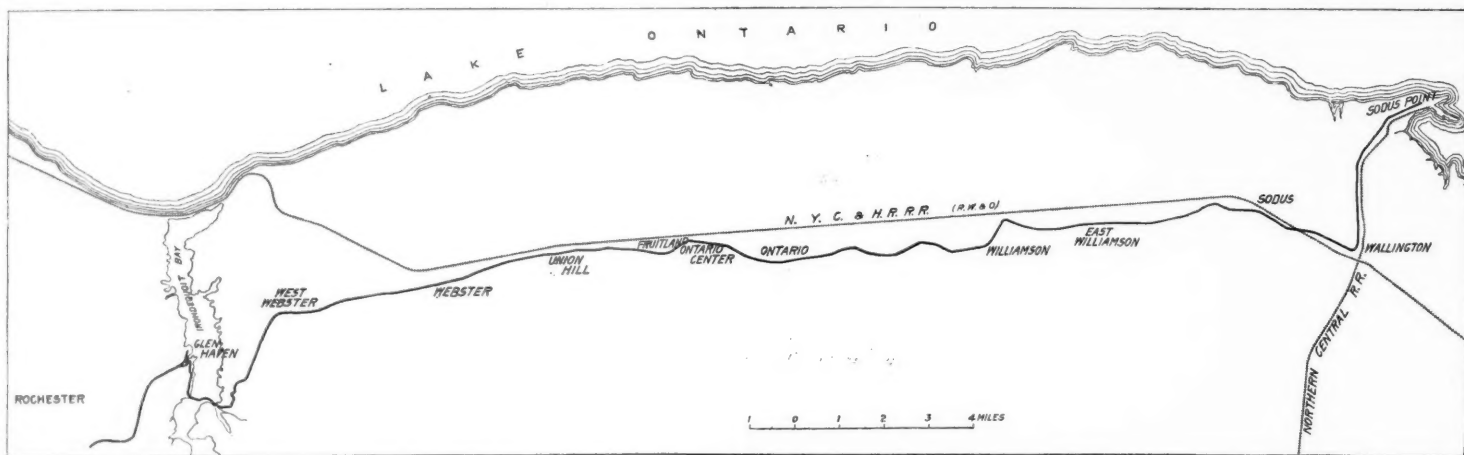
Concrete Viaduct on the Utica & Mohawk Valley Near Herkimer, N. Y., Showing End of Bridge.

a large and steady business has been secured in a very short space of time; and it is increasing in rapid ratio. Three express cars are run over the lines each way daily, and agents are maintained in each of the important towns along the route, who collect and distribute goods with wagons. The electric express rates are somewhat lower than the rates of the regular express company, and it is an interesting fact that the latter have been raised instead of lowered since the competition began. This express service over such portions of the line as were then opened began last December, and, like the passenger business, is increasing rapidly month by month.

The attitude of the New York Central lines toward the Utica & Mohawk Valley seems very wise, and serves well as a precedent for treatment of interurban main-line com-

passengers up in the heart of the town and runs frequent cars. Cars are run to Clinton every half hour at the crowded time of day and every hour at the slack times, as against seven trains a day on the New York, Ontario & Western. The running time on the electric road is nearly an hour, as against about half that time on the steam trains.

From Syracuse, as a center, there are at present three competitive lines in operation, reaching Auburn, 27 miles distant, by a line paralleling the Auburn road of the New York Central; Baldwinsville, 13 miles, paralleling the Lackawanna; and Fayetteville, 14 miles, paralleling the Chenango branch of the New York Central. The Auburn & Syracuse road is at present single track, although graded for double track for half the distance, and it runs



Rochester & Sodus Bay Line, Paralleling the Rome, Watertown & Ogdensburg.

as a center, the Utica & Mohawk Valley electric line runs 23 miles east to Little Falls and 15 miles west to Rome, paralleling the New York Central, with a nine mile branch to Clinton, paralleling the New York, Ontario & Western. The main line between Rome and Little Falls is built for the most part on private right of way, except through the town. It is a double-track road laid on a solid road-bed with heavy rail and gravel ballast, and the average cost of building it was about \$25,000 per mile, although the eight miles between Herkimer and Little Falls, involving the 10-arch concrete viaduct and the 225 ft. steel span with three 55 ft. steel spans, shown in the illustration, cost over \$700,000. The line handles express traffic, but no heavy freight, competing in express traffic not only with the steam railroad but with the small "pirate" boats on the Erie canal, which have no fixed schedule of rates but carry freight for whatever they can get, the rates having at times been as low as five cents for a box or package carried from Utica to Little Falls. The line between Utica and Little Falls is composed of several older electric lines which have been acquired and rebuilt by the present management and it was open for through traffic on May 1, 1903. Heavy interurban cars, with transverse seats and smoking compartments, and equipped with air-brakes and whistles, are run every half hour between Rome and Little Falls and the running time is an hour and 15 minutes between Utica and Little Falls, 22 miles; and 45 minutes between Utica and Rome, 16 miles. The average rate of fare is 1½ cents a mile single and 1⅞ cents a mile round trip, with special commutation rates, as against 2 cents a mile on the steam route, and the electric cars carry a very large share of all the passenger business between the points named. It is pretty hard to get traffic returns which are of any value in treating of

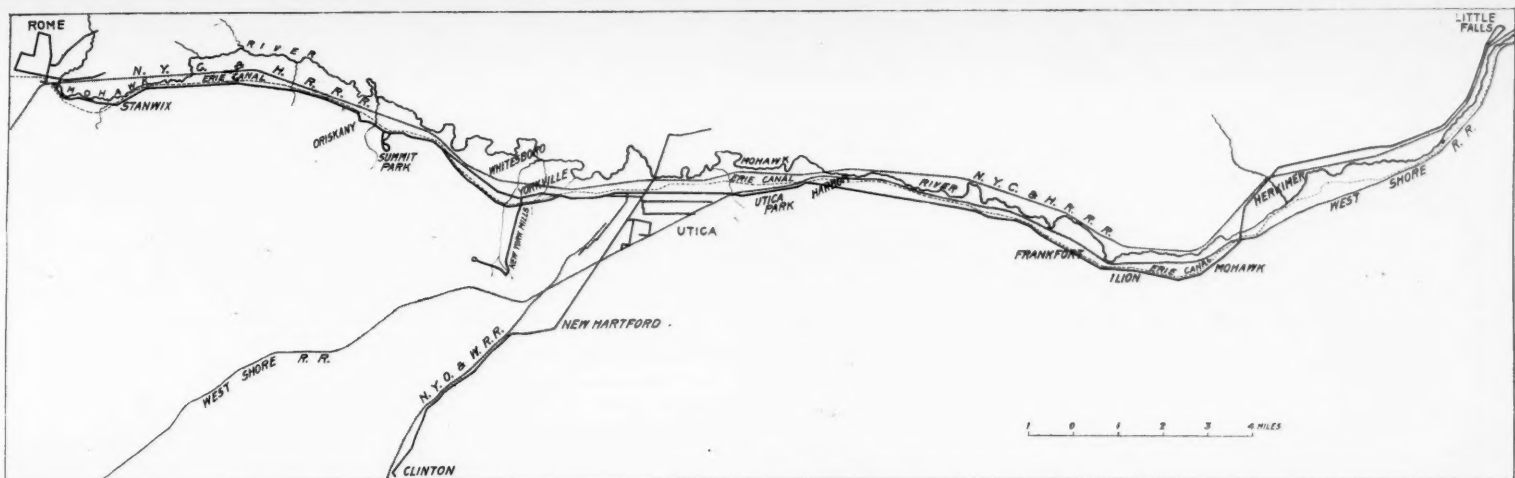
petition. So far as the competitive features are concerned, the electric roads are ignored entirely and no effort is made to reduce rates or change time schedules to meet them. The result of this has been that in the period immediately following their installation the local business of the steam road has been greatly hurt; but as the electric lines develop and perfect their service and become better and more widely known, they act in a different way, bringing a long haul traffic to the steam roads which, at present, is fully compensating for the loss of short haul and will probably do better than that in the near future. The reasons for this may be several; the most immediate one is probably that the convenience and cheapness with which local residents can reach the railroad stations serve to start them traveling, while the electric roads, at the same time, constantly increase the settlement of the ter-

on private right of way for 17 of the 27 miles. Part of the road was built some time ago. Since this line was opened on the 23rd of last June, its operating statistics are not shown; the traffic of an interurban road newly opened in the summer months is made up, to a large degree, of excursionists and those who take the ride for the novelty, while the permanent "commuter" traffic has not had a chance to become developed. As the road runs directly through the New York Central territory, however, and is only distant from three to five miles from the steam road, it is likely that the same competitive conditions will hold as elsewhere.

The Syracuse, Lakeside & Baldwinsville road is chiefly interesting as showing the different attitude on the part of the steam railroad toward the competition, an attitude which seems unwise, although there is a considerable difference in the traffic conditions involved, as will be pointed out. The distance from Syracuse to Baldwinsville, a town of 3,000 inhabitants, is 13 miles. The town is located on the branch of the Lackawanna which runs from Binghamton to Oswego, and there are summer resorts between it and Syracuse. Before the electric line was open, approximately five years ago, the round trip on the Lackawanna between Baldwinsville and Syracuse was 80 cents; the rate on the electric road was made 15 cents single fare, 25 cents round trip; and to meet this the Lackawanna cut its rate to 10 cents one way, with a round trip rate of 15 cents, which is less than six mills a mile. Additional trains were put on and a freight station near the center of the town was utilized for passenger traffic, the regular passenger station being some little distance away. The steam road has been entirely unable to secure the traffic however, even at this cost. The electric road maintains a half hour service the year round



Top View, 10-Arch Viaduct.



Utica & Mohawk Valley Lines, Showing Steam Roads Paralleled, and Erie Canal.

with frequent extra service in the summer months, and gets practically all the business. There is a feeling of hostility towards the steam road in Baldwinsville because a similar cut was made some time ago to dispose of a competitor and the rate was afterwards raised again, and this fact doubtless has influenced the present result.

It was said that traffic conditions between Syracuse and Baldwinsville were somewhat different from those along the line of the Utica & Mohawk Valley. In general, the principle seems to be this: That interurban lines which parallel the main line of a steam road, designed primarily to carry through traffic, help it, in the long run, by building up its contributory territory and serving as a feeder. In the case of a branch line from a steam road, however, the conditions may be reversed, since the branch line is either dependent on local traffic for support or else pays for itself by the through traffic which it brings to the connecting point; and if the electric line which parallels it monopolizes the local traffic and hauls passengers to the main line direct for through traffic, the purpose and earning power of the branch may be greatly diminished. On the Syracuse & Baldwinsville line, with its projected extension to Oswego, only the first of these conditions would hold, since, on account of the distance, there would be no chance that passengers for points beyond Binghamton, on the Lackawanna road, would go by electric lines, even if such lines were built; but, as a matter of fact, the Binghamton and Oswego branch is dependent, to a large degree, on local traffic, which is being hard hit by the present competition, in the very limited area in which this competition at present exists. What the attitude of a steam road in such cases should be is a question admitting of considerable debate, since the steam road is placed in the position of competing with electric lines in the field to which the latter are best adapted.

A more striking example of branch-line competition is seen in the competition of the Rochester & Sodus Bay electric line with the branch of the Rome, Watertown & Ogdensburg, which runs from Rochester to Pulaski. Sodus Bay and the nearby town of Sodus are located about 40 miles from Rochester, on Lake Ontario. The country in between is thickly settled with prosperous towns, and is a great producer of fruit, vegetables, and country produce consumed in Rochester. The electric line began operation in July, 1900, and has a route which runs through the main streets of the six or seven towns

between Rochester and Sodus, and for the most part follows the highway, except on certain comparatively short stretches. Comfortable interurban cars with air-brake, smoking compartment, etc., are run from Rochester hourly, and freight trains made up of four or five regulation freight cars hauled by an express motor car are run twice daily to Sodus Point, in addition to which the passenger cars can carry a small amount of baggage and express in one end of the smoking compartment. The road a short time ago bought 11 second-hand box cars, Merchant's Despatch, and uses these in the manner mentioned, in addition to certain flat and coal cars previously owned. The motor cars which haul them are equipped with four 30 h.p. motors, and each of the freight cars carries from 12 to 15 tons of freight. Severe grades and curvatures on part of the line near Rochester prohibit the use of longer trains. The freight and express business on the Sodus Bay line for the year ending June 30, 1903, amounted to about \$21,000 as against approximately \$14,000 the year previous. Two solid cars of dressed meat are running each week from various points between Rochester and Sodus, and a milk car is run every day. The rates on milk are the same as those on the Rome, Watertown & Ogdensburg, although the rate on cream is less. There are 16 milk stands along the line, located conveniently to the producers, as against five stations on the steam road, and the electric road does practically all the milk business between Rochester and Sodus. In the season about 300 crates of berries are carried daily on the electric line, which gets the major part of the business, with slightly lower rates. A very large percentage (estimated at 90 per cent.) of the package freight out of Rochester is handled on the combination passenger and express cars which run hourly from 6 a.m. to 7 p.m., the rates on express goods being from one to three cents per hundred cheaper than on the steam lines.

A characteristic feature of the Rochester & Sodus Bay traffic, similar to that of the Syracuse, Lakeside & Baldwinsville, but more interesting, owing to the longer distance involved, is that the electric road has almost all the local passenger traffic in spite of the fact that its passenger rates are higher than those of the steam road. The town of Williamson, 30 miles from Rochester, was selected for purposes of comparison because it was not a lakeside resort with a peculiar traffic of its own during

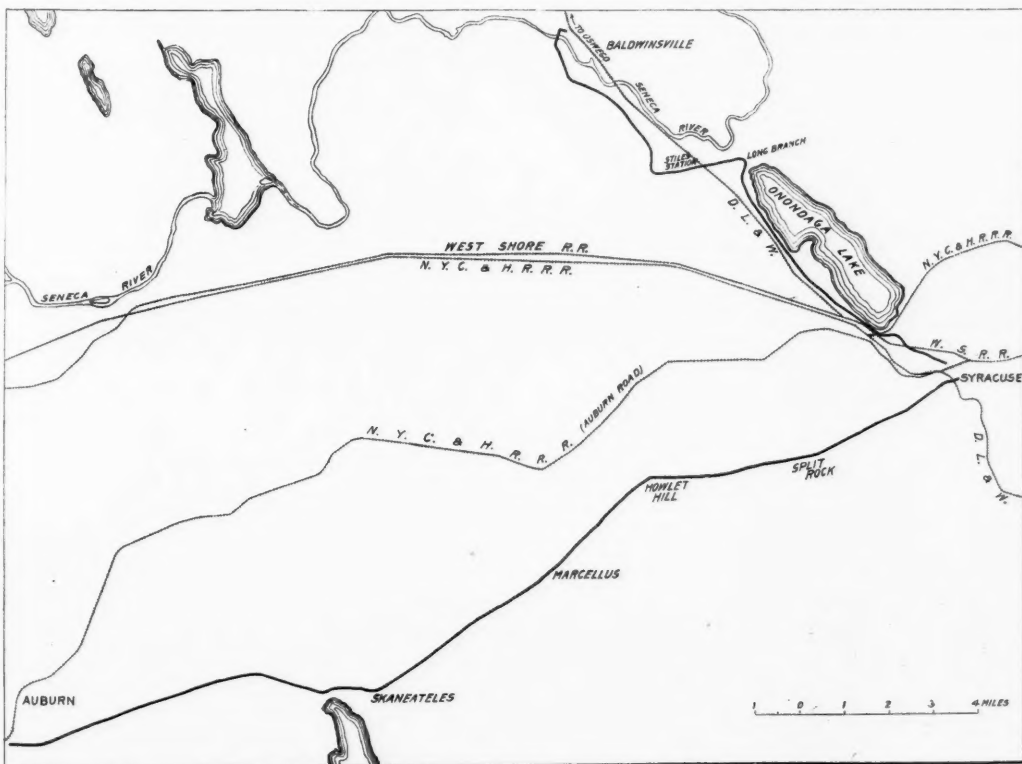
the summer months, and because it was far enough away from Rochester so that it would not be included in the category of the very short haul, which falls naturally to electric roads as suburban business. The old railroad rate to Williamson was \$1.40 round trip. The electric road took all the traffic as soon as it was started, whereupon the steam rate was cut to 90 cents round trip. This did not serve to secure the business, however, and the rate is at present 30 cents single and 55 cents round trip, or less than a cent a mile, as against 40 cents single and 60 cents round trip on the electric line; yet the aggregate of single and round trip tickets sold from Williamson to Rochester by the steam road in a single month this current year, was only about 70 per cent. of the number sold the same month three years ago. The steam road has made no cut in local freight rates, although there has been a slight falling off in traffic. The significant point, however, is that the electric road has made the gains, and has developed the traffic over the head of its steam competitor.

The item of convenience is undoubtedly the controlling influence in this instance. The Rome, Watertown & Ogdensburg runs from half to three-quarters of a mile from the main street of most of these towns, and commercial travelers on the interurban line can have their trunks left directly in front of the local hotel where they wish to stop, instead of paying an additional charge for having them carried from the station. Moreover, the electric cars have the great advantage common to all electric traffic of collecting passengers throughout the city streets of Rochester, and carrying them through to their destination in the same car.

This road is a particularly good example of branch-line competition, just as the Utica & Mohawk Valley is an excellent example of main-line competition, and it seems probable in this case that, however unprofitable and disagreeable the process may be, the steam road will find it necessary to compete sharply for whatever traffic it gets between the competitive points. If such competition involves carrying at a rate below cost, the electrification of the steam line may be the only solution, in spite of the heavy handicap it has in its location and in its interest charge on private right of way and heavy construction. It is a case where profits, if they are to be got at all, will have to be figured closely.

Mention may also be made of the likelihood that the proposed Rochester, Syracuse & Eastern electric line will be built in the near future, connecting Rochester with Syracuse. A line known as the Rochester & Eastern Rapid has almost completed 45 miles of track from Rochester to Canandaigua and Geneva, similar in character to the Rochester & Sodus Bay line, except that it runs almost entirely on private right of way and has easier grades and curvature. This latter line parallels the New York Central and also, in portions, the Lehigh Valley. Its route from Rochester to Canandaigua is two miles shorter than the so-called Auburn Road, of the New York Central. A line of similar character paralleling the main line of the New York Central is also nearing completion, running west from Schenectady.

The next few years will doubtless show much more clearly what the ultimate effect of electric competition is to be; whether or not it will prove helpful to main-line business, as now seems probable, and whether it will prove destructive to branch-line business. Through their official classification as street railroads, the electric roads secure an enormous advantage, in their ability to combine the speed of a steam train with the convenience of a local trolley car; making railroad time on their private right of way through the fields and then proceeding boldly down the main streets of the towns through which they pass. The small station force necessary to conduct their business, with consequent saving in pay roll, is another point of advantage which has received comparatively slight consideration. Including express agents, the Utica & Mohawk Valley has only 11 station men on its pay roll, as against approximately four times that number employed by the steam lines between the same points. In view of the general similarity of practice among railroads in regard to stations and agents, the methods of handling interurban business, which have been developed according to a system radically different, are becoming more and more interesting, and may contain valuable lessons and suggestions for the working of steam branch-lines.



Auburn & Syracuse, and Syracuse, Lakeside & Baldwinsville Lines.



ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 83 Fulton Street, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

ADVERTISEMENTS.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.

An article on the electric lines in northern New York State, printed elsewhere in these columns, differentiates between the effect of electric competition on main lines of steam railroads and on branch lines. The writer believes that the two are wholly distinct; that an interurban road paralleling the main line will tend to benefit it, by acting as a collector of through traffic and marshaling it at specified points, and also by developing the territory common to both. But a branch line, in general, depends for passenger business either upon local short haul traffic, which the electric road will surely take from it, or upon its services as feeder to the main line, and if the interurban road assumes the duties also of a feeder to the main line direct, the economic services of the branch would seem to be much diminished. There may be consolation in the thought that through freight traffic still remains, and that some little steam mileage, even of branch lines, still remains unparalleled and unappalled.

Elsewhere in this issue is a description of the cars being delivered to the Interborough Rapid Transit Co. for use in the New York subway now nearing completion. The design of these cars has been carefully considered and seemingly every precaution taken to prevent fire. The body of the car is copper sheathed wood, and the floor and underframing protected by heavy layers of mineral wool and asbestos. The wiring circuits are heavily insulated, and so placed as to avoid the possibility of their coming in contact and causing a fire by short-circuiting the high voltage currents which will be used. These precautions will doubtless prevent any accidents in ordinary service, but they are of doubtful value in case of an accident such as the one in the Paris subway in which the wrecked trains took fire. When a wooden car is smashed and splintered into little pieces no amount of asbestos or copper sheathing can prevent the ruins taking fire if they are exposed to it. The designers of naval vessels, appreciating the dangers of fire, have replaced wood and other combustibles wherever possible on shipboard with steel, and specified that such as still remains be impregnated with a fireproofing compound. The same thing should be done in passenger car construction, for, in the transportation of passengers, safety is the first consideration. In all cars operated by electricity, particularly those running in tunnels or on elevated structures, the additional safeguard against accidents should be sufficient to warrant the use of steel underframes and even steel bodies. The modern Pullman car has come to be looked upon as practically collision-proof, as indeed it is, but even it may be destroyed by fire if caught in a burning wreck and once started, the large amount of wood

used in its construction makes good fuel. Twenty per cent. of the weight of the car is in the wooden underframing. A steel underframe can be made at a substantial saving in weight, and such a construction would be stronger and safer both from collisions and fires than the present complicated wooden truss construction. The following press clipping is of more than passing interest:

"KANSAS CITY, Mo., August 12.—Postal clerks of Missouri, Kansas, Colorado and New Mexico, in convention in this city yesterday, passed a resolution calling on the government to compel all railroads to build steel frame mail cars. According to statements made in the convention, old and rotten mail cars are responsible for the deaths of half the railway postal clerks that are killed each year."

This may be a slight exaggeration, but it contains grains of truth. The use of steel in passenger equipment is not new, but, so far as we know, only one small lot of steam road cars has been built with steel frames. The Pressed Steel Car Co., pioneer in the steel freight car business, is now at work perfecting the design of a steel fireproof car which will be watched with interest. If the danger from fire and telescoping can be eliminated from accidents the loss of life and property will be minimized. The experience of recent years with steel freight cars would seem to indicate that a steel passenger car can be built which will get rid of these dangers to a great extent if not entirely.

The Rock Island Company.

The acquisition of the Seaboard Air Line by the Rock Island is another step in the progress of this company towards becoming one of the very large railroad systems. The original Chicago, Rock Island & Pacific Railroad Company was chartered in Illinois, February 7, 1851, and opened its line between Chicago and the Mississippi River in 1854. A period of normal expansion then followed until the year of 1880, when a consolidation between the Chicago, Rock Island & Pacific Railroad Company and its connecting lines was effected. The new company formed by this consolidation was the Chicago, Rock Island & Pacific Railway Company, and owned, leased or operated about 1,300 miles of road. For the next twenty years the system continued to expand until, in 1901, it controlled 3,818 miles of road. The increase in mileage during this period was due to the building of extensions and the acquisition, either by lease or purchase, of the following lines: Des Moines & Fort Dodge, St. Joseph & Iowa, Kansas City & Topeka, Chicago, Kansas & Nebraska, and the Chicago, Rock Island & Texas. During the early part of 1902, the mileage of the Rock Island System was still further increased by the lease of the Rock Island & Peoria and the Burlington, Cedar Rapids & Northern, and by the purchase of a controlling interest in the Choctaw, Oklahoma & Gulf, and the St. Louis, Kansas City & Colorado. In July, 1902, the Rock Island Company was organized in New Jersey, with an authorized capital of \$150,000,000, consisting of \$54,000,000 preferred and \$96,000,000 common stock. At the same time the Chicago, Rock Island & Pacific Railroad Company was formed in Iowa, with a capital stock of \$125,000,000 and \$75,000,000 in 4 per cent. bonds. The offer which was then made to the shareholders of the Chicago, Rock Island & Pacific Railway Company was accepted. According to the terms of this offer, the Chicago, Rock Island & Pacific Railroad Company paid for the outstanding shares of the railway company \$100 in its 4 per cent. gold bonds and also \$70 in preferred stock and \$100 in common stock of the Rock Island Company. The Rock Island Company thus became the holding company of the capital stock of the Chicago, Rock Island & Pacific Railroad Company.

Following this rearrangement in 1902, the year 1903 has proved to be the greatest in the history of the Rock Island System. Early in May, 1903, it acquired, by purchase, a controlling interest in the St. Louis & San Francisco Railroad Company, thus adding 5,333 miles to its system; two weeks ago it obtained a majority holding in the stock of the Evansville & Terre Haute; on August 12 it was made public that the Rock Island people had been elected to the Board of Voting Trustees and to the Board of Directors of the Seaboard Air Line, and now the Rock Island is one of the largest systems in the country, controlling between 17,000 and 18,000 miles of road. Its western lines connect with the Seaboard Air Line at Birmingham, and from there the new acquisition gives outlets to the Atlantic ocean and the Gulf of Mexico at seven different points: Baltimore, Md.; Norfolk, Va.; Savannah, Ga.; Wilmington, N. C.; Fernandina, Jacksonville and Tampa, Fla.

This does not necessarily mean that a new impor-

tant competing trunk line has been established, but the change will undoubtedly strengthen the Seaboard Air Line and will aid materially in insuring harmony and more stable conditions in rates. The present Rock Island System extends from the Atlantic ports west through Birmingham over the St. Louis & San Francisco to St. Louis, Memphis and New Orleans, and by way of the Choctaw, Oklahoma & Gulf to the western part of Texas, where it joins the line from Chicago to El Paso. It also goes as far west as Denver and Colorado Springs, and touches Kansas City, Omaha, St. Paul and several points in the Dakotas. It has also a line from Chicago southward to the Ohio River at Evansville. The rapidity with which the system has developed is shown by the following table of the number of miles of road controlled, leased or operated by the system since its first line was finished in 1854:

1854.	1870.	1880.	1890.	1900.	1901.	1902.	1903.
154	591	1,349	3,339	3,646	3,818	7,032	18,006

The estimate for 1903 is compiled as follows:

	Miles.
By ownership or lease:—	
Chicago, Rock Island & Pacific Railway	7,032
St. Louis & San Francisco	5,333
Evansville & Terre Haute	185
Lines building	1,500
By joint ownership:—	
Seaboard Air Line	2,611
Half interest in the Houston & Texas Central, Dallas & Sabine Pass, Houston East and West Texas, and the Houston & Shreveport	1,345
Total	18,006

Buffalo, Rochester & Pittsburg.

The showing for the year ending June 30, 1903, is good, with considerable increases in both gross and net earnings, and in train load. The mileage of road worked remains at 472, no additions to the main line having been opened for several years, but about 25 miles of new second track was added during the year, to facilitate traffic at congested points, and an increase in sidings was also made. Beginning August first of the current year, moreover, 28 miles of the new Indiana branch were put in operation, from a point near Punxsutawney, to the new town of Ernest, Pa., where coal properties acquired by the Jefferson & Clearfield Coal & Iron Co. are being developed, and further extension of this same branch from Ernest to Black Lick, Pa., on the Indiana branch of the Pennsylvania, will be completed about Oct. 1. A trackage contract has been made with the Pennsylvania for the 20 miles from Black Lick to Vintondale, which will enable the Buffalo, Rochester & Pittsburg to move tonnage direct from the mines of the Lackawanna Steel Co. to the works of the latter, at Buffalo. A contract, which appears advantageous, has also been made with the Pittsburg Gas Coal Co., in accordance with which an extension will be built from Ernest, to lands near Elder's Ridge, Pa., 17 miles southwest, and the railroad will receive for transportation the entire output of the coal company, at the latter place. This line is expected to be ready for operation before the close of 1903, and a large tonnage over it is anticipated. The company already has trackage rights over the Beech Creek extension of the New York Central which give it access to the Reading, and has a strong position in the coal territory, earnings from coal constituting over 55 per cent. of the receipts from freight traffic during the past year.

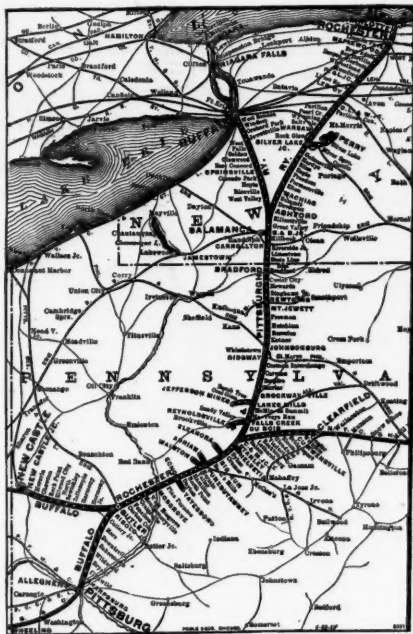
Gross earnings from all sources were \$7,452,736, as against \$6,313,246 in 1902; an increase of \$1,139,490, or 18 per cent. Gross earnings per mile of road were \$15,789, showing, of course, the same percentage of increase. This is the largest percentage of gain per mile of road made in any year since 1887, the gains at that time following the reorganization effected shortly previous. In the report under review, moreover, the increase in operating expenses, although considerable, has not been excessive; amounting to about 14 per cent., so that net earnings increased from \$2,681,241, in 1902, to \$3,220,330, or 20 per cent. After payment of interest, rentals, taxes and sinking funds, there remained \$1,781,594, net income, as against \$1,274,265, last year. For extraordinary expenses and improvements, \$42,015 was charged to net income, as against \$39,562 last year, and, in addition, \$908,734 was appropriated, representing the principal of car trust bonds paid off during the year (\$128,000), and the entire expenditure for new construction, except the cost of the Indiana branch. Last year, \$544,000 was appropriated for a like purpose.

Equipment obligations have been steadily increased for the past few years, and this year a total of \$1,191,000 equipment bonds were issued, and \$1,135,000 additional were authorized. The net increase in bonded debt was \$63,000, however, since the holders of \$1,000,000 four per cent. debenture bonds exchanged them for the same amount of common stock at par, and \$128,000 of car trust bonds were paid off and cancelled. But car trusts now stand at \$3,642,000 on the balance sheet, as against \$2,579,000 in 1902, and \$2,033,000 in 1901.

The number of locomotives owned was increased from 185 to 231, during the year, and their average tonnage capacity for level track haul increased from 5,024 tons to 5,600 tons; an important gain. Considerable additions to freight car equipment were also made, effecting a slight gain in average car capacity, which now stands at about 31¾ tons. Average freight train load increased from

405.6 in 1901 and 423.6 in 1902 to 441.5, and the percentage of loaded cars in freight trains increased from 56.92 in 1902 to 58.05; the most marked gain in recent years. Owing to the nature of the traffic, the mileage of empty cars is of necessity high.

Out of surplus income, which was augmented by \$600,000 received as a 15 per cent. dividend on the Rochester & Pittsburg Coal & Iron Co., the Buffalo, Rochester & Pittsburg paid its stockholders 6 per cent. on the \$6,000,000 preferred stock and 4 per cent. on the common, and



Buffalo, Rochester & Pittsburg.

in spite of the increase caused by the bond conversion, 3 per cent., semi-annual, was declared on the common stock, payable Aug. 14, this year. A surplus of \$2,121,270 was carried forward to profit and loss, as against \$1,363,349, in 1902. The Coal & Iron Co., which contributed so handsomely to the surplus income, was purchased about 20 years ago, and stands in the assets at a valuation of \$1,003,670. Its surplus for the fiscal year, out of which the 15 per cent. dividend was paid, amounted to \$1,561,086, and was arrived at after taking \$114,000 from net earnings as principal of bonds paid off, and \$294,552, spent for new equipment of mines, etc. The company also purchased the securities of the Consolidated Coal & Iron and of the Indiana County Coal Co., during the year, the amount disbursed up to June 30, 1903, amounting to \$696,495; and construction of the Adrian Furnace, at Falls Creek, Pa., was undertaken. This furnace, which is now nearing completion, will have a capacity of about 250 tons a day.

The following is a statistical abstract of the more important items contained in the report:

	1903.	1902.
Miles of road worked.....	472	472
Passenger earnings.....	\$927,939	\$920,256
Freight earnings.....	6,466,487	5,362,552
Other earnings.....	10,076	9,774
Miscellaneous.....	48,232	20,662
Total earnings.....	\$7,452,736	\$6,313,246
Maintenance of way and structures..	\$532,743	\$534,642
Maintenance of equipment.....	988,523	835,267
Conducting transportation.....	2,558,128	2,121,874
General expenses.....	153,010	140,221
Total expenses.....	\$4,232,406	\$3,632,004
Gross income.....	\$3,220,329	\$2,681,241
Net income.....	\$1,781,594	\$1,274,264
Deduct:—		
Extraordinary ex. and appropriations.	\$950,749	\$583,561
Surplus of income.....	\$830,845	\$690,703

The paper by William E. Langdon on the position and protection of the third rail on electric railroads, which was read before the Institution of Civil Engineers, London, at the engineering conference last June, and which is reprinted in another column, gives a thorough review of the subject. A list is also given which includes most of the lines operated by third rail. In view of the extremely rapid increase of electric traction during the last five years, it seems rather surprising that so little use, comparatively speaking, is made of the third rail as a conductor, especially in view of the fact that its cost of installation and maintenance is estimated by some experts at approximately 30 per cent. less than the cost of the overhead conductor. For use in small towns and cities the advantages of the overhead conductor are obvious, on account of the inevitable danger attending the use of the third rail, but on private right of way, where cars are run at high speed this is not the case. The point of contact between the trolley wheel and the conductor wire is so small that arcing constantly occurs, involving the rapid destruction not only of the trolley wheels, the best of which will not last much more than a week, but also of the overhead wire, particularly on grades and at points where the maximum power is re-

quired. Moreover, when a trolley car is running 40 miles an hour, the trolley pole, in case the wheel jumps the wire, becomes a formidable weapon for the destruction of property and is sure to cause considerable damage before the car can be stopped, although improved forms of trolley pole catchers have lessened this danger. On private right of way the third rail seems pre-eminently the desirable conductor, but as soon as a highway is crossed or the right of way enters a village street, its use becomes practically prohibited under existing conditions. In certain cases, notably on the Albany & Hudson, the cars are equipped with two means of collecting the current, using the sliding shoe on the third rail while they are on their private right of way and the overhead trolley elsewhere. Even this system is thought to work out a little cheaper than continuous overhead construction, but the complications attending the double installation are such that its use is not being extended, except in yards and at terminals where many switches make the trolley necessary. In spite of the frank disadvantages of the overhead wire for high speed cars, therefore, it seems quite unlikely that any extended application of the third rail can be made on interurban lines, at least for the present.

Rejection of the Panama Canal Treaty.

Press despatches from Panama Aug. 17 say that the Colombian Senate, at Bogota, has rejected the Panama Canal treaty. The information given is meagre and no one can foresee the results of this action. It is reported that the Colombian government intends to submit a new treaty, which will not require further ratification by Colombia, but is likely to prove unacceptable to the United States. Press reports say that the alternative threat of the Nicaraguan route was not taken seriously at Bogota. Panama is very much aroused by the action of the government, and there is talk of secession, and the formation of a Republic of Panama, which would be strongly in favor of an American-built canal.

NEW PUBLICATIONS.

Universal Directory of Railway Officials. Compiled from official sources under the direction of S. Richardson Blundstone, editor of the *Railway Engineer*. London: The Directory Publishing Co., Limited, 3 Ludgate Circus, E. C. Sole representative for the United States, E. A. Simmons, 1333 Broadway, Brooklyn, N. Y. 1903. Price 10 shillings.

The new volume of the directory is similar to previous issues in form and contents. The edition at hand is the ninth, and has been carefully revised and brought up to date. The additions which have been made are distributed practically evenly among railroads located in all parts of the world. Practically all tramways in the United Kingdom which are worked by power are included. The railroads are divided according to location, under the classifications of England and Wales, Scotland, Ireland, Europe, Asia, Africa, Australasia, North America, Mexico, Central America and West Indies, and South America, in addition to which there is a thorough system of indexing, a list of hotels owned or managed by railroads in the United Kingdom, a list of railroad supply companies, etc. As a convenient book of reference, the directory is unique and valuable.

The Star Improved Steam Engine Indicator. By George H. Barrus. New York: D. Van Nostrand Co., 1903. Cloth, 140 pages.

Although this book was prepared for the manufacturers of the Star indicator and is in that sense an advertisement for the new apparatus, it is still an unbiased statement of all the facts needed by a purchaser or user of an indicator whether unfamiliar with the particular form of instrument described or with the general subject. It is intended as a useful book of reference and instruction in the practical work of indicating. There are a number of valuable hints as to how to get best results in taking cards, a chapter on valve setting by the indicator, and numerous useful tables for computing the power developed by an engine from indicator cards.

The Proportions and Movements of Slide Valves. By William D. Wansbrough. Manchester: The Technical Publishing Co., Ltd., 1903. Price 4s. 6d.

This work is an analysis of the slide valve by Zeuner diagrams. The text originally appeared as a series of articles in *The Mechanical World* which have been gathered together in book form in response to many requests for their re-publication. Fifty diagrams covering practically every case which may be solved by the Zeuner method are given with concise directions for laying them out. A general explanation of the method used and the assumptions made is covered in the opening chapters. The book is a valuable one for engineers and students.

The Art of Pattern-Making. By I. McKim Chase. New York: John Wiley & Sons, 1903. 254 pages. Price \$2.50.

This book is written by a man with much experience in the difficult art of pattern-making and is a valuable addition to the rather meagre literature on the subject. While it can hardly be said to justify the author's sub-title of a comprehensive treatise it covers the field as well perhaps as it is possible to do so in a work of this kind. There is much good stuff in its pages and it is clearly and concisely written.

TRADE CATALOGUES.

The Ingersoll-Sergeant Drill Co., New York, has published its Catalogue No. 43, for 1903, describing the rock drills, mining, tunneling and quarrying machinery which it makes. It is a large book of 170 pages, handsomely and artistically printed and profusely illustrated with half-tones of the machines described and the work which they are doing all over the world. It contains a complete description and ordering guide of the four types of air drills made by the company, bar, track and undercutting channelers, gadders, coal cutters and prospecting machinery besides a brief mention of a number of other machines and tools described in other catalogues. The book contains as well much valuable information about modern mining and quarrying operations and a number of useful tables for contractors and engineers.

Concrete-Steel Engineering Co., New York, has published a small pamphlet of much interest and value to engineers engaged in any sort of concrete work. This company is the agent for the Thacher steel bars for reinforcing concrete and the little book which it has prepared contains all the necessary information for the design of re-enforced concrete work. The properties of the various sizes of Thacher bars are given in tabulated form and there has also been calculated a very complete set of tables of safe loads for re-enforced beams and slabs. The Thacher bar is specially adapted for this class of work. The sectional area is practically uniform throughout and all changes of section are made on gradual curves. Once bedded in the concrete they will not slip or cause cracks.

The Union Switch & Signal Company, Swissvale, Pa., has issued Section 3 of its Catalogue of Interlocking and Signaling devices. This section is devoted to mechanical locking and operating parts, such as facing point locks, switch and lock movements, front rods, lock rods and drawbridge couplers. Selectors, scotch blocks and other devices are shown. The catalogue is a book of 132 pages. As before announced, the different "sections" in the series planned by the company, are not being issued in regular order but according to the demand for matter on different subjects. We have now, however, sections 1, 2 and 3, which together would make a catalogue of 317 pages. The other numbers thus far issued are sections 5 and 13.

Otis Elevator Company, New York, has issued a handsome catalogue in which are described the various systems of elevator power and control which it makes. These include electric drum winding engines, the duplex motor system, vertical, horizontal and inverted plunger types of hydraulic elevators for both freight and passenger service. This company is one of the pioneers in the elevator business and make a specialty of designing difficult and exacting installations for any service. The safety devices with which all of its machines are equipped are fully described and illustrated, as are also a number of characteristic elevators.

The Pneumatic Engineering Co., 128 Broadway, New York, has issued an illustrated catalogue of 48 pages, printed on heavy paper. The different systems of pumping by compressed air as made, sold and installed by the company, are described. The subject is divided into three heads, air lift pumps, displacement pumps, using air expansively, and displacement pumps which use direct pressure of air without expansion, and each topic is separately treated. Outlines of descriptions needed for making estimates are included.

Chicago & Alton's passenger department has published two attractive little books, "People You Meet in the Dining Car" and "Her First Run." The first is a series of pictures each with a humorous comment showing the diversity of types of the traveling public which patronizes the popular dining cars of the Alton. The other is the account of a society girl's run in charge of the Alton Limited.

Pittsburg Valve & Fitting Co., Pittsburg, has sent out a preliminary catalogue A, devoted to the various forms of cast iron pipe fittings which it makes. This is a new company which has recently erected a large plant for the production of all sorts of valves and pipe fittings, and the catalogue just issued is to be supplemented later with others describing the other products of the company.

Edvard Harrington, Son & Co., Philadelphia, have sent out a complete illustrated catalogue of their line of machine tools which includes lathes, multiple and radial drills, boring mills, and a number of miscellaneous tools, chain hoists, chucks, gears, trolley hoists, turntables, etc.

Westinghouse Electric & Manufacturing Co., Pittsburg, has issued Circular 1,937 devoted to engine-type alternators. Both the rotating field and rotating armature types are described and there a number of illustrations of large installations of these machines.

The Cassmire Refrigerator Co., New York, makers of all sorts of refrigerators using the Cassmire system of dry cold air circulation, has issued a new catalogue describing a few of the many forms which it makes.

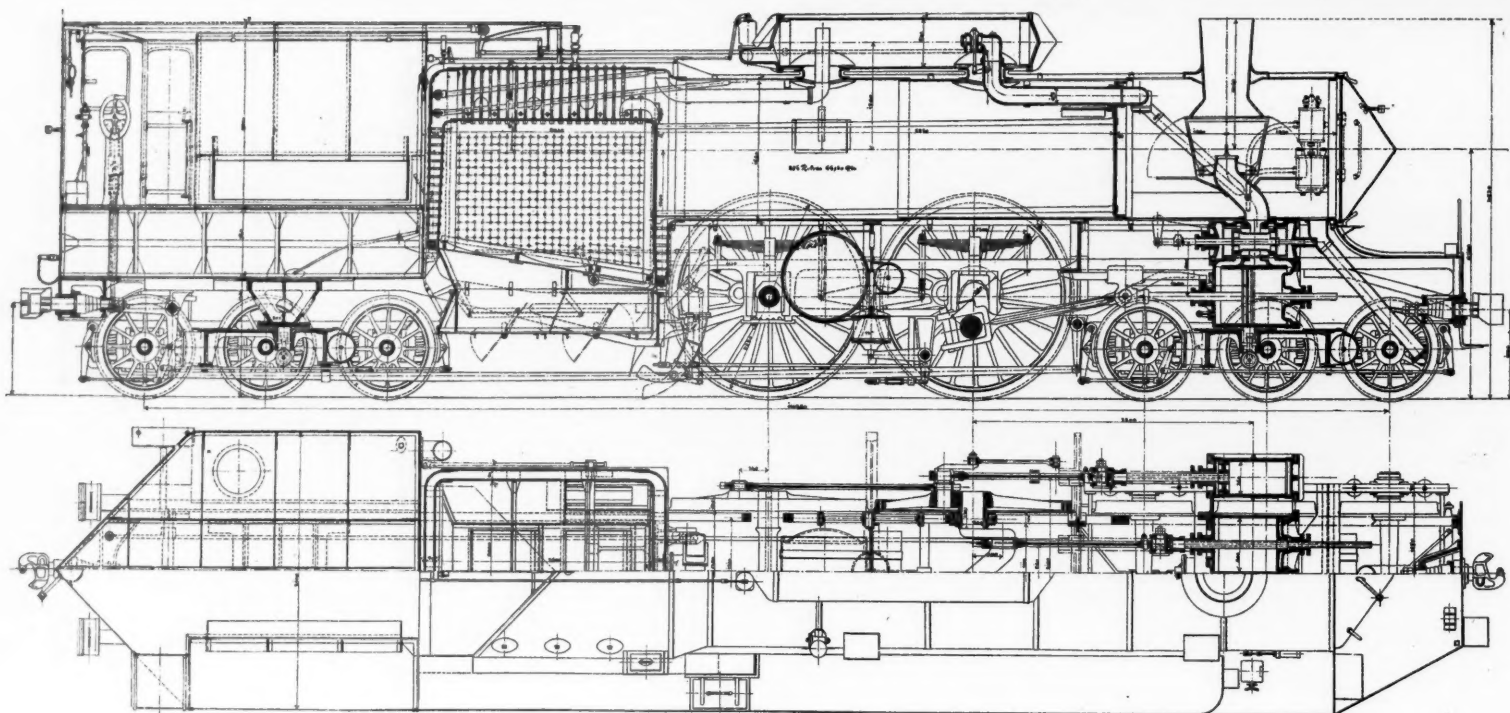


Fig. 1.—Four-Cylinder Balanced Compound Tank Engine—Designed by R. Avenmarg.

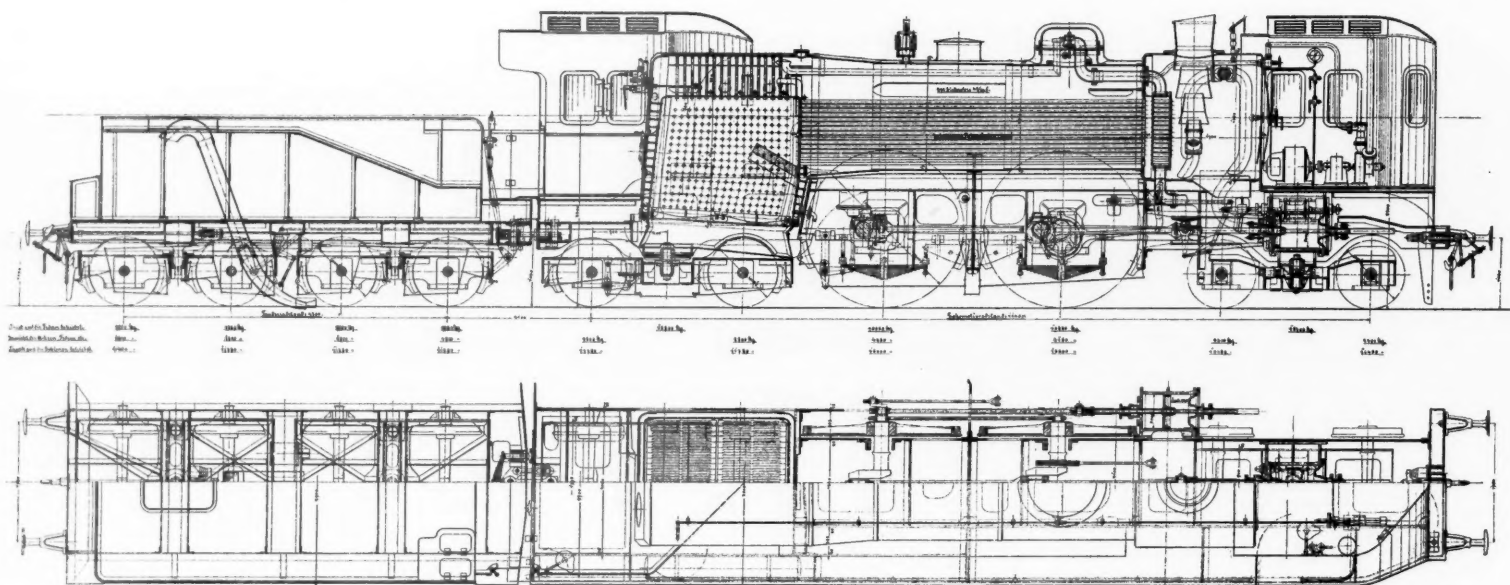


Fig. 2.—Three-Cylinder Compound Engine—Designed by Chief Engineer Kuhn.

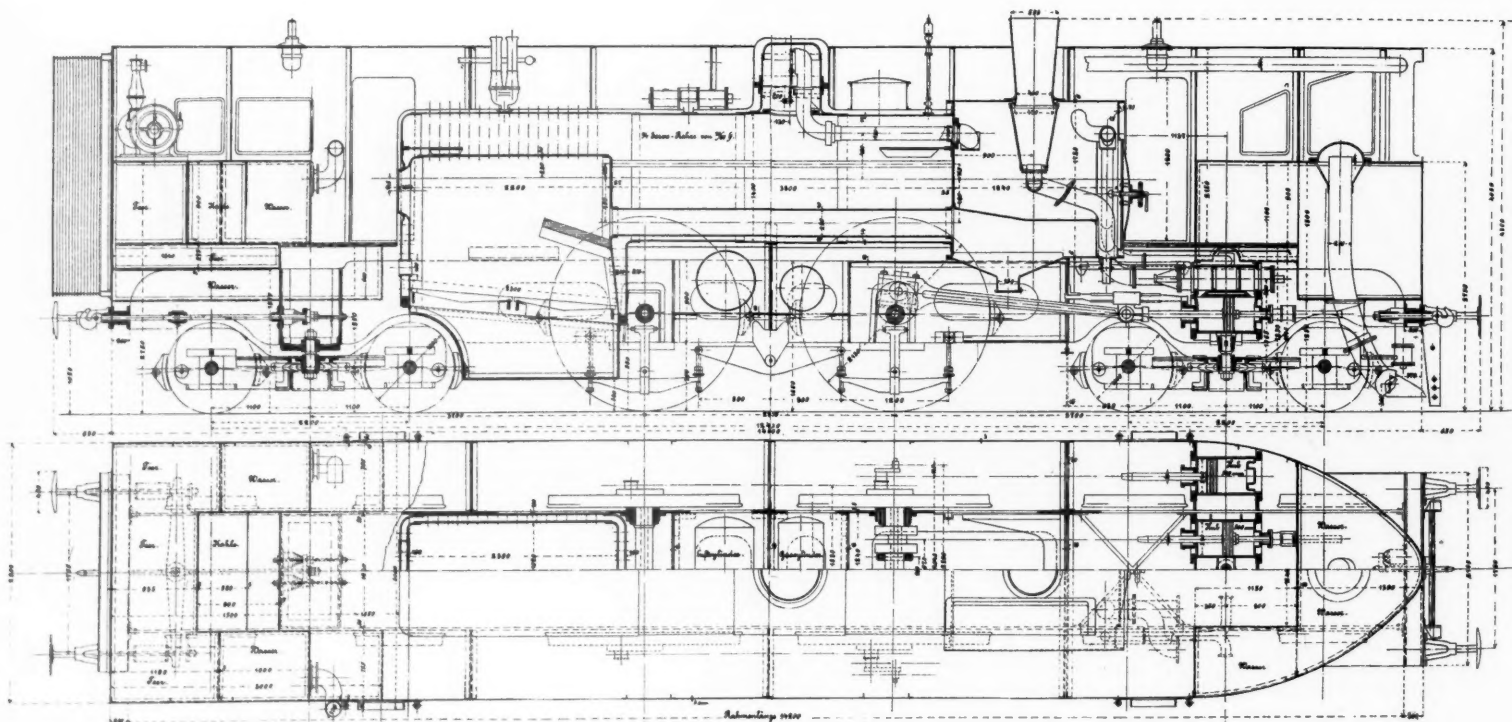


Fig. 3.—Four-Cylinder Simple Tank Engine—Designed by Government Engineer Mehliis.

German Locomotive Designs for High Speed Service.

BY LAWFORD H. FRY.

In the last few years there has been noticeable among German engineers a growing feeling that electric traction is becoming a formidable rival of the steam locomotive for high speed railroad service. In the endeavor to strengthen the position of the steam engine the Society of German Mechanical Engineers instituted last year a competition for a design of a train to be hauled by a steam locomotive at a mean speed of 75 miles per hour and to carry 100 passengers. The awards in this competition, which was open from March to December, 1902, were published in *Glaser's Annalen* for Feb. 15 and March

Design No. 2 is a three-cylinder compound with separate tender. The cylinders are the Wittfeld type, all of the same diameter. The two outside cylinders are for the low pressure with the pistons moving together while the inside high pressure cylinder has its crank at right angles to those of the low pressure cylinders. Three coupling rods are provided, two outside in the usual position and the third inside. This necessitates a crank axle for the trailing drivers and adds to the number of wearing surfaces without giving any corresponding advantage. Two boiler designs were submitted, one with a Schmidt superheater and the other shown in Fig. 2, with an enlargement of the steam pipe in the smoke-box serving as a steam dryer. The engineer's cab at the front end

order to give an easy exit the ends are tapered off as much as the buffers will permit and the connection between the cars is made with a spring vestibule platform similar to the American type. The cars are heated by steam, the system being divided into three parts, two of which can be controlled by the passengers, the third being operated only from the outside. The committee who examined the designs thought so highly of this train that they brought it to the attention of the German Minister of Railways.

In looking over these locomotive designs it seems questionable whether the conditions of the problem were such as to require such radical departures from standard practice as are shown. The two most powerful designs have

No.	Designer.	No.	Cylinders.	Diam. of boiler.	Diam. of pres. drivers.	F-box.	Super-heater.	Total.	Grate area.	Mean diam. of flues.	Length of boiler.	Water.	Fuel.	Weight in working order.		
														Engine.	Tender.	Total.
			Style	In.	Lbs.	Sq. ft.	Sq. ft.	Sq. ft.	Sq. ft.	In.	Ft. in.	Gallons.	Tons.	Pounds.	Pounds.	Pounds.
1.	R. Avenmarg	4	Compound	14-24 x 27	89	227	161	...	2,960	54	17-3	5,300	6	254,000	...	254,000
2.	Ch. Eng. Kuhn	3	Compound	20 x 25	90	200	140	580	1,935	40	16-5	4,200	7	164,700	99,200	263,900
3.	Gov. Eng. Mehlig	4	Simple	15 x 20	84	170	129	410	1,710	25	12-1	2,300	2-8	165,000	...	165,000
4.	Ch. Eng. Peglow	3	Simple	*20 x 26 †15 x 22	90	200	143	...	2,325	39	17-5	5,300	8	174,200	105,800	280,000

*Inside. †Outside.

1, 1903. Thirteen designs were submitted and five prizes of five hundred dollars each were awarded. In four cases the awards were made on the merits of the locomotive designs. The fifth design, which was submitted by Privy-Councillor Prof. von Borries, covered both engine and train and received the award for the design of the latter. The engine had a single pair of drivers carrying 39,700 lbs., which is above the axle load permitted by the German Government, and was therefore not admitted to consideration in the competition. In making these awards the committee praised the work done but expressed the opinion that the designs could be improved; they therefore arranged a second competition among the five competitors who were successful in the first.

The table herewith gives a comparison of the main dimensions of the four prize designs. Two of these are for tank locomotives and two for engines with separate tenders. In all four cases the engineer is placed in front of the engine, being separated from the fireman except in design No. 1, which runs with the fire-box ahead, putting both men at the leading end. The designers have all given some consideration to the reduction of the wind resistance, one (design No. 4) going so far as to give both engine and tender a sheet iron covering tapered in front to a boat-like prow, and coming down to within 16 in. of the rails. The tank engine in design No. 3 is also given a smooth sheet iron covering over all. All four designs are for four-coupled engines with leading and trailing trucks.

Design No. 1 (Fig. 1) has six-wheeled trucks front and back, while the others have four-wheeled trucks. This engine is a four-cylinder balanced compound with American style bar frames. It has no tender but carries 5,300 gallons of water and six tons of coal. The gain in weight made possible by the use of tanks on the engine instead of a separate tender would seem to be more than counterbalanced by the inconveniences of handling an engine of this weight and length in the shops.

has double windows with steam heat between to prevent the view being obscured by frost.

Design No. 3 (Fig. 3) is for a tank engine with four high-pressure cylinders. The cranks are arranged on the Schlacht system to avoid any unbalanced inertia forces. The inside cranks are at an angle of 112 deg. with each other, with the outside cranks at 52 deg. The angle between each inside crank and the nearest outside crank is 98 deg. To reduce the air resistance to a minimum the entire engine is covered with a sheet iron shell tapered in front and carried down to the tops of the truck wheels. The driving wheels are covered with discs of metal and the truck wheels are filled in with lignum vitae. Too much reliance has been placed on the reduction of resistance to be thus effected and the design is deficient in heating surface and grate area.

Design No. 4 (Fig. 4) is a three-cylinder single expansion engine with separate tender. As in design No. 2, a third coupling rod is provided inside, and to avoid the bending moment in the axle due to centrifugal force, the rotating masses of the system between the frames are balanced by extending the cheeks of the axle cranks beyond the line of the axle. The valve motion is a novel design, using two Corliss valves for admission and two for exhaust on each cylinder, making 12 valves in all. The exhaust valves are driven direct from the crosshead, giving the same exhaust and compression for all cut-offs. The multiplicity of parts appears to deprive this device of all practical value.

The train designed by Herr von Borries consists of three corridor coaches, Fig. 5, each with two six-wheel trucks. They weigh 102,500 lbs. and 105,800 lbs. The length of each coach is 68 ft. 10 in. over all, and the seating capacity of the three is 110 people, with baggage compartments at each end of the train. The exterior is noticeably smooth in finish, to reduce the air resistance to a minimum. The lower part of the side wall of the car is built as a wooden truss with iron bracing. In

2,900 and 2,325 sq. ft. of heating surface, and weigh with tender 254,000 and 280,000 lbs. respectively. These figures can be equaled in regular American practice. For example, the Chicago & North Western Atlantic type with 3,016 sq. ft. of heating surface and an engine weight of 158,000 lbs., or with a 5,300 gallon under say 260,000 lbs., or the Buffalo, Rochester & Pittsburg Atlantic type with 2,950 sq. ft. and an engine weight of 153,500 lbs. or say 255,000 lbs. total.

Practical Forestry.

In an address to the National Lumber Manufacturers' Association, Mr. Gifford Pinchot, United States Forester, made the subject clear by the following illustration: Suppose any one of you has a tract of timber land in Arkansas, for example—for we have some good figures for that State. You find that under certain conditions, which make practically no difference in the cost of getting out your logs—and it is the business of the Bureau of Forestry to ascertain what those conditions are—you can get a second crop of the same amount off that land in 40 years. It will be a man's tendency, as it was mine when I began this work, to think of 40 years as a very long time, a period beyond ordinary calculation, hardly worth while to figure on. Nevertheless, if I interpret the economic tendency of the country at all rightly, men look farther ahead now than they once did, and it is very well worth their while to do so. We will say that in 40 years you can get a second crop on that land equal to the first. We take the stumpage at its present value, with taxes as they now stand, and we estimate the expense of protection against fire and theft. We find in this particular case that the returns on the capital invested for those 40 years is 6 per cent. net. That is calculated on the basis of the present value of stumpage. We all know that the value of stumpage will increase largely in 40 years."

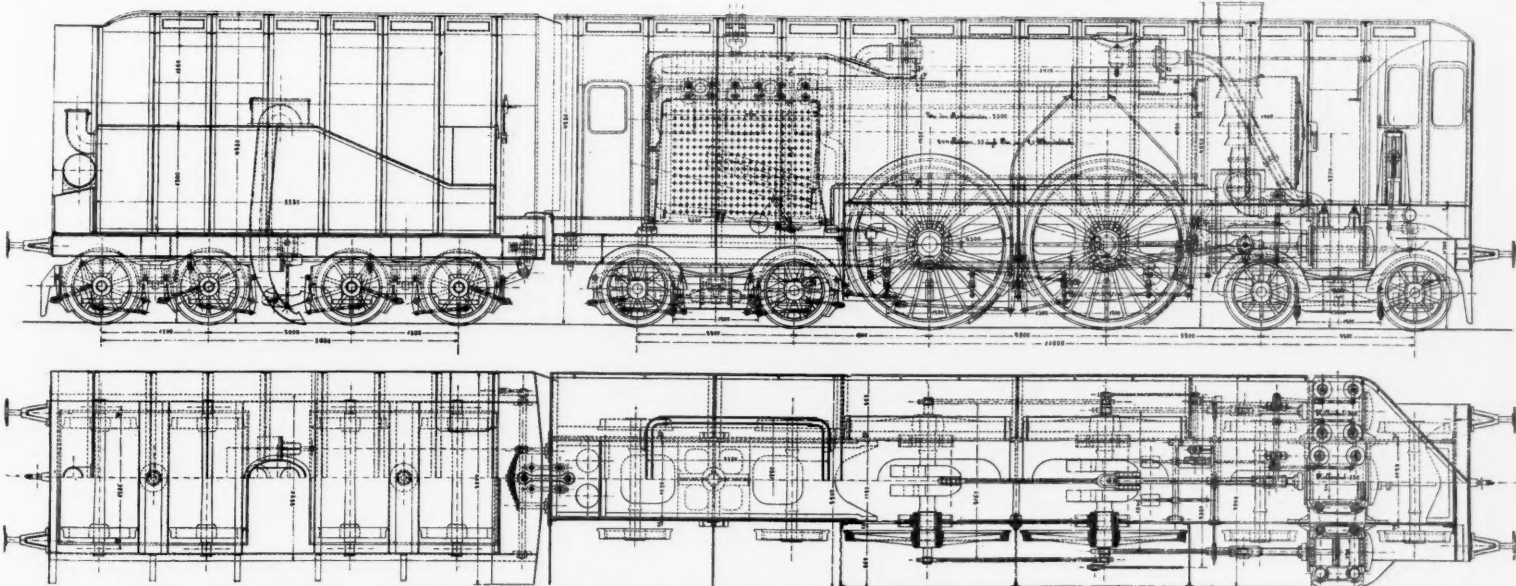


Fig. 4.—Three-Cylinder Simple Engine—Designed by Chief Engineer Peglow.

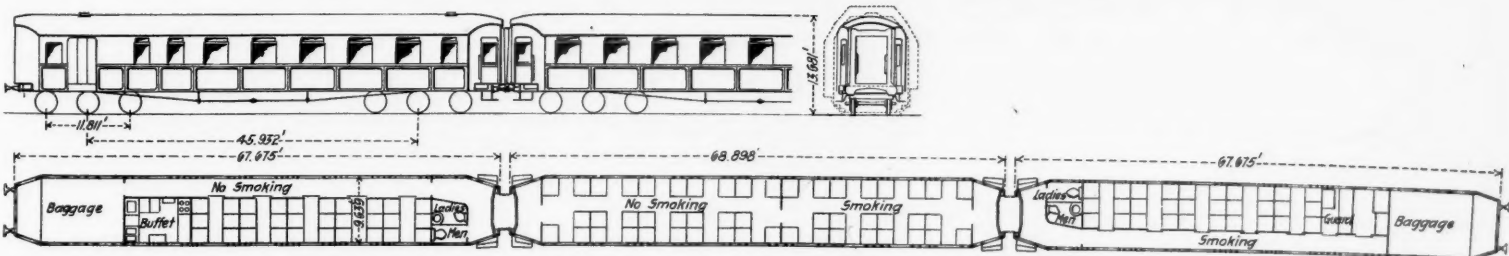


Fig. 5.—Three-Car Train—Designed by Prof. von Borries.

The Life of Treated Ties.*

The first treated ties, on the Atchison, Topeka & Santa Fe, were laid in 1885 and the record here given ends in 1902, a period of 17 years. Unfortunately the record of the removals was not kept until 1897, or 12 years after the first ties were treated, so that the number of ties failing during that interval has been estimated. The removal of ties treated in the years subsequent to 1897 down to 1900 gives, however, an approximate rate of removal by means of which the number removed in the earlier years can be estimated. This assumes, of course, that the character and efficiency of the treatment has not changed. The upper line in the accompanying table, up to and including the 11th year, gives the percentage of total ties removed. The lower line of the table gives the deduced

tion of removals for other causes than decay is estimated at not less than 5 per cent. and may be as high as 10 per cent.

The 1885 to 1888 ties are characterized by a certain freedom from longitudinal and end checks, while those of subsequent years have the checking quite marked, giving the tie the appearance of being split into many strips. When these ties are taken out they go into strips. Another feature is the manner in which the decay progresses. A number of 1885-1888 ties after three years in the track were broken in two pieces by the driving wheel flange in a bad derailment. Examination showed a layer of decayed wood on the bottom and up the side as far as the earth was in contact, about one-quarter of an inch in thickness in which the wood was entirely decayed, the balance of the tie remaining entirely free from appear-

allowable bending moment in the rail of 120,000 inch-pounds, and a unit stress in the joint of 12,000 lbs. The two parts of the joint are duplicates, each having an area of 6.98 sq. in., giving a bending moment of 63,000 inch-pounds, or 126,000 inch-pounds for the pair. The net weight of the joint is 47.21 lbs. The parts are cut in 12½ in. lengths, and are secured by a double row of ¾ in. bolts, four in a row.

New Design of Builders' Mold for Concrete Work.

An arrangement designed to simplify and expedite construction work on monolithic concrete masonry has lately been patented by Mr. Thomas C. Farrell, of Washington, N. J. It does away with expensive and complicated frames, standards, cross-pieces and stays, and continuous

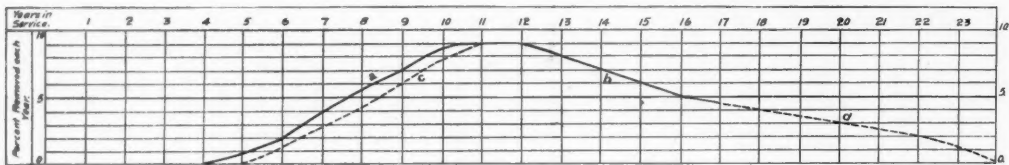


Diagram Showing Percentages of Ties Removed During Successive Years of Service.

mean percentage removed during each year while the next to the last line gives the percentage removed as determined from reports after the 11th year. The percentage of ties removed is shown graphically by the diagram.

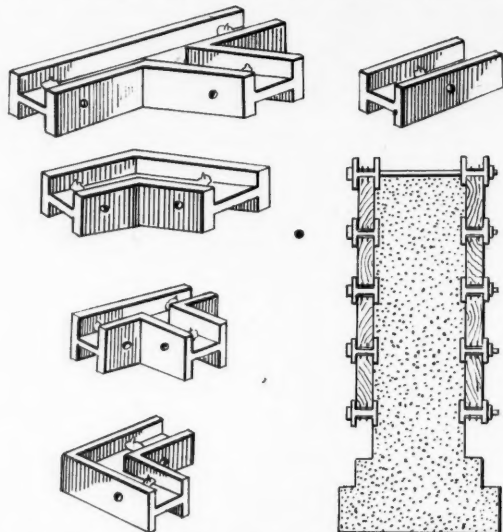
According to the table the ties treated in 1885 should have been exhausted in the 17th year, while it has been found that many of the 1885 ties are still in service and good for many years. There are probably 20,000 of these ties in yet, certainly 15,000, hence the estimated percentages, for the earlier years have been reduced where there is no record and applied it to the 1885 ties alone, as shown by the line "C" on the diagram. A careful and extended inspection shows that ties treated in the earlier years are giving a better record than those subsequently treated. The 1885 ties and those treated in the three or four years subsequent are almost identical in general appearance and soundness, and can safely be expected to give a record eventually about equal to those of 1885. They are characterized by the manner in which decay progresses commencing at the surface in contact with the earth, the fiber being destroyed regularly in succession as it passes upward, leaving many of those ties now in 14 to 17 years with almost half of the timber sound enough to make good fuel. Those of subsequent years

ance of decay. This applied to every tie, nearly a hundred in number. A number of ties treated in 1885, or the two or three following years, when removed in the course of recent renewals, showed the same decay, i.e., from the bottom upward so that about half of the volume of the tie was gone, but the remaining upper half was still sound enough for good fuel.

Ties treated in some of the subsequent years showed decay permeating the body of the tie irregularly and the tie when removed would go all to pieces.

Perhaps the best illustration of this manner of progress of decay will be the facts as they occur.

The year in which the ties are put in the track is the starting point. The year in which the first ties fail is another step, the rate from there on is the curve of failure and the year at which the last are removed is the culmination. It is here attempted to place a close approximate value to these various terms. If every piece was exactly alike in texture, density or soundness, all should fail at once, but this is never so. It would be very interesting to know what the curve representing the life of the untreated timber of various kinds really is. This so far seems never to have been recorded, and here is a difficulty encountered when comparing the treated ties with



Combined Box-Cap and Shoe-Plank Holders and Section of Mold.

sheathings of planks throughout the height of the structure. The essential feature of the method is a combined box-cap and shoe-plank holder, having two vertical sides connected by a horizontal web, the cross-section being H-shaped. Bolt holes having their axes in the plane of the web extend through the holders, for the insertion of tie-bolts. The mold planks are set between the sides

PER CENT. OF TREATED TIES REMOVED ON THE SANTA FE.

Year.	No. treated.	2d.	3d.	4th.	5th.	6th.	7th.	8th.	9th.	10th.	11th.	12th.	13th.	14th.	15th.	16th.	17th.	—Total Ties— "B" A & B
1885.....	111,503										39.40	17.14	14.16	10.75	8.26	4.13	5.28	59.72 99.12
1886.....	333,298										7.40	5.44	3.89	3.25	1.55	2.00		23.51 53.34
1887.....	189,386								21.41	12.06	13.68	11.95	11.92	4.83	5.45			59.99 81.41
1888.....	285,104							13.64	5.03	6.79	7.15	7.41	4.62	3.82				34.82 48.46
1889.....	169,174						7.92	1.94	3.51	5.27	7.03	4.18	4.24					26.17 34.09
1890.....	105,753					3.62	3.80	3.80	8.33	10.70	8.31	11.05						46.09 49.74
1891.....	128,568				1.48	1.20	1.48	4.56	9.10	5.71	10.84							32.89 34.37
1892.....	187,270			.05	.54	2.84	6.93	11.20	9.40	12.98								43.89 43.94
1893.....	178,167		.20	.20	1.95	2.72	7.17	7.01	11.34									30.39 34.57
1894.....	247,566	.07			1.40	1.68	3.08	5.80										11.96 12.03
1895.....	256,877			.06	.75	1.77	3.46											6.04 6.04
1896.....	336,070			.16	.71	2.51												3.38 3.38
1897.....	380,523		.03	.07	.52													.62 .62
1898.....	350,377	.02	.09	.91														1.02 1.02
1899.....	460,382	.07	.26															.33 .33
1900.....	151,977	.12																.12 .12
Totals.....	3,872,425	Per cent. as per reports "B"			1.	2.	4.	5.5	7.0	8.5	9.	9.	7.75	7.	6.	5.	4.5	76.25
Deduced mean per cent.		.07	.13	.30	.98	2.12	4.32	5.72	7.77	8.92	9.07	9.53	7.77	5.68	5.42	3.06	5.28	76.14

show that decay spreads through the body of the tie at a much earlier period. All of the earlier ties were treated by the "Wellhouse" or zinc-tannin process.

In this tabulation all ties removed, whether on account of decay or of breakage from derailments or from premature removal in relaying rails or in ballasting are included. It is well known in practice that many ties that may still serve for several years are removed after being disturbed by relaying rails or in ballasting. The propor-

untreated ties. The life of the Rocky Mountain pine has been variously estimated at from a mean of from five years down to four or less. Then if the "Wellhouse" treatment gives a mean of near 12 years, we have nearly trebled the life. Figures so far indicate nearer 14 years than 12.

The Hinchliffe Rail Joint.

The rail joint shown in the illustrations, designed by R. Hinchliffe, Winnetka, Ill., is for an 80-lb. rail, A. S. C. E. section, and is proportioned on the basis of an

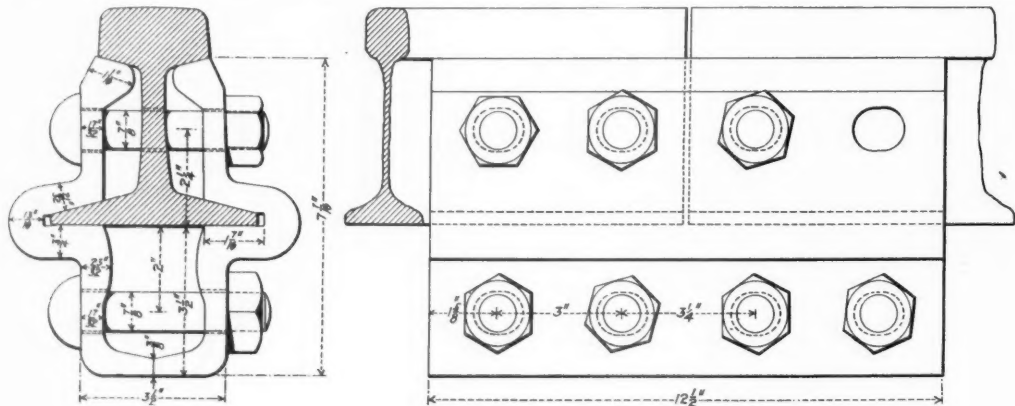
of the holders, their edges resting on the webs. Small spurs on the enlargements formed by the bolt holes engage the planks to hold them firmly.

Illustrations of various forms of holders are shown. The straight form is for joining the meeting ends of two planks and to stiffen planks at intermediate points of their length; the L-form is used for rectangular branches; the T-form is useful at corners and ends; the Y-form is for the outside angle of obtuse-angled bends or branches; and the obtuse-angle form is for the inside of such bends or branches. The holders are connected in transverse pairs by tie-bolts, which draw together the opposite sides of the mold.

The method followed to avoid the use of continuous sheathing is first to lay four or five courses of the wall, or whatever the structure may be, in 10-in. lifts, the mold planking being 2 in. x 10 in. From this point, for each succeeding course, the bottom planks and holders are withdrawn and placed on top, this process continuing to the completion of the structure.

The Espen-Lucas Cold Saw Cutting-Off Machine.

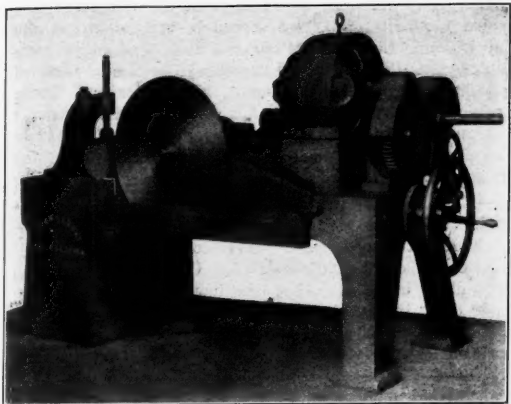
The new-style bar cold saw cutting-off machine of the Espen-Lucas Machine Works, Philadelphia, Pa., is shown in the accompanying engraving. There are three sizes of these machines, having saw blades 12, 22 and 28 in. in diameter respectively. The illustration shows the largest size, having a capacity of 9 in. and motor driven. It is equipped with a variable automatic feed, and an automatic safety stop, which can be arranged to cut material to any depth up to the capacity of the saw. There are swiveled clamps on the platen for cutting straight or at



The Hinchliffe Rail Joint.

an angle. These can be entirely removed, permitting a large variety of jig and special work.

The machine is driven by a hardened crucible-steel



Espen-Lucas Cold Saw Cutting-Off Machine.

worm, phosphor-bronze worm wheel and compound gearing. The gears are made of crucible steel and cut from solid blanks. The spindle is made of hammered crucible steel.

TECHNICAL.

Manufacturing and Business.

The Cherry Valley Iron Company of Pittsburg is to build a new blast furnace at West Middlesex to take the place of the Fannie furnace. Walter Rhodes, President; E. N. Ohl, Vice-President.

Mr. B. S. McClellan, formerly with the Illinois Central and also the New York Central, has accepted a position as salesman with the Curtin Supply Company, Chicago, Ill., with headquarters at that city.

The Frontier Steel Company, Denver, Colo., recently organized, is to increase its capital and has bought 300 acres of land near Denver, where it will shortly build shops. Lawrence Phipps, formerly of Pittsburg, is connected with this company.

The American Steel Castings Company will shortly remove its works from Chicago to Indiana Harbor, Ind., where a new building, 60 ft. x 500 ft., will be built of steel and corrugated iron. C. W. Quarrier is the engineer in charge.

Walter Loring Webb, Assoc. M. Am. Soc. C. E., who has just finished building at Morgantown, W. Va., a large power house and several miles of electric road, laid out and built under trying conditions, has returned to his Philadelphia office, 411 Walnut street.

The New York Central is to put into its shops at West Albany, N. Y., four 500 h.p. water tube boilers; two horizontal, cross-compound, non-condensing steam engines to drive 600 k.w. generators; two 600 k.w., non-condensing turbines, and two 600 k.w. engine generators, for all of which bids are asked Aug. 24 by H. Fernstrom, Chief Engineer, New York.

The Prouty-Pierce Company has been incorporated with a capital of about \$200,000, and, according to report, has bought land at Kansas City, Mo. Shops will be built to manufacture gasoline engines for use as locomotives on interurban railroad lines, and also on mine cars. Enoch Prouty, of Chicago, and S. W. Pierce, Junction City, Kan., are interested.

The Union Rail Company has been incorporated, with a capital of \$50,000. It has secured the plant of the Huntington Tin & Planished Company, Huntington, W. Va., which will be remodeled and be equipped with bar mills. The company will make bar iron and steel. A. F. Baumgarten & Bro., of Pittsburg, Pa., hold a majority of the stock. The general office is to be located at Huntington, while the President and Manager will be at Pittsburg.

The Oregon Bridge Company, of Oregon, Ohio, has been reorganized and incorporated under the laws of the State of Delaware, with a capital stock of \$50,000. The plant will be removed from Oregon to Lebanon, Ohio, and headquarters will be at this place after Oct. 1, where a steel and brick building 200 ft. x 75 ft. will be put up to make iron and steel bridge work, etc. The officers are: John Bradbury, President; C. A. Spencer, Vice-President; P. R. Spencer, Treasurer, and H. W. Ivins, Secretary.

Iron and Steel.

The Carnegie Steel Company, Youngstown, Ohio, will place in operation shortly at the Union Works the new continuous 10-in. mill, with a capacity of 250 tons a day.

W. M. Carpenter, formerly connected with the Buhl Malleable Iron Company, of Detroit, Mich., is now General Manager of the Norway Iron & Steel Company, of York, Pa.

The Montrose Iron & Steel Works of Frederick, Md., has been incorporated with a capital stock of \$25,000, and will build works to make gray iron castings. The foundry is expected to be in operation within a few weeks.

The Southern Structural Steel Company has been incorporated, with a capital stock of \$100,000, and is building shops to make iron and steel work. D. F. Young-

blood, President, and G. L. Youngblood, Secretary and Treasurer.

Following the action of the eastern courts, and to avoid conflict of interest, Judge Beatty, in the United States Circuit Court at San Francisco, on the petition of Roland R. Conklin and others, has appointed James Smith, Jr., of Newark, N. J., receiver for the Union Iron Works, San Francisco.

Press reports state that the Hon. Geo. A. Cox, of Toronto, will resign from the Vice-Presidency and Executive Committee of the Dominion Iron & Steel Company, and that the interests of the company in Toronto will be looked after by J. H. Plummer and Frederick Nicholls, of the Executive Committee.

The Harrisburg Pipe & Pipe Bending Works, Harrisburg, Pa., last week made the first steel at its new basic open-hearth. The company expects shortly to have another furnace in operation, and a third before 1904. The rolling mill and a new pipe department will be started when enough steel is produced by the new furnaces to keep them in operation.

Alva C. Dinkey has been elected President of the Carnegie Steel Company, succeeding Mr. W. E. Corey, who has resigned, and now is President of the United States Steel Corporation. James H. Reed has been appointed chairman of the Board of Directors, a new office recently created. A. R. Hunt has been appointed General Superintendent of the Homestead Steel Works, and H. D. Williams, General Superintendent of the Duquesne plant.

The Providence Steel Casting Company of Providence, R. I., incorporated with a capital stock of \$150,000, is reported as about to build a steel foundry at Providence. Bids may soon be asked for the construction of the buildings. The company will make steel castings by the Tropenas process, for which it holds patent rights in Rhode Island and a portion of Massachusetts. Darwin Almy is President; F. W. Hartwell, Secretary, and E. M. Shaw is also interested.

A despatch from Denver, Colo., states that Stephen Little, Comptroller of the Denver & Rio Grande, is making an inspection of the property of the Colorado Fuel & Iron Co., with John D. Rockefeller, Jr. Mr. Little is reported as stating that the most important action of the annual meeting on Aug. 19 will be the appropriation of \$7,000,000 for the completion of improvements now under way. Also that \$8,000,000 will be voted for other improvements, including a tin plate mill, tubing plant and wire mill, to be completed in three years.

Heavy Locomotives for the B. & O.

An officer of the B. & O. writes that that road has under advisement the building of a 150-ton locomotive of the Mallet articulated type for use on heavy grades. It is the intention to have this locomotive do the work of two and dispense with a pusher. No definite decision has yet been reached as to the details of the design.

The Center of the Iron and Steel Industry.

Allegheny County, Pa., made 52.5 per cent. of all the pig iron that was made in Pennsylvania in 1902; 73.5 per cent. of all the Bessemer steel; 57.2 per cent. of the open-hearth steel; 70.3 per cent. of the crucible steel; 65.3 per cent. of the total production of all kinds of steel; 62 per cent. of the Bessemer steel rails; 65.9 per cent. of the structural shapes; 55.9 per cent. of the plates and sheets, and 58.5 per cent. of the total production of all kinds of rolled products.—*Bulletin of the American Iron and Steel Association.*

Yellow Pine.

The present stand of yellow pine in the southern States has been stated by Mr. R. A. Long, in a paper read before the annual meeting of the Southern Lumber Manufacturers' Association, to be about 137,000,000,000 ft. About 163,000,000,000 ft. have probably been lumbered already. For the census year of 1900 the total cut of yellow pine was given as nearly 10,000,000,000 ft. These figures show that at the present rate of consumption the present stand of longleaf yellow pine will be exhausted long before a second crop can be produced to take its place.

High Speed Tests in Germany.

Beginning next week a series of high speed tests will be conducted on the line between Hamburg, Hanover and Berlin which will be a continuation of the trials made on the Berlin-Zossen military railroad. Electric locomotives will be tried as well as motor car trains and speeds of 100 miles an hour at light load and 90 miles an hour at heavy load will be attempted. The tests on the Berlin-Zossen line were discontinued about a year ago because the speeds were limited by the light track construction. The German Reichstag has recently made an appropriation for this line for heavier rails and ties and the tests will be continued as soon as the reconstruction is completed.

A Test of the Niclausse Boilers.

The United States Navy Department has arranged for an exhaustive test of the Niclausse boilers in September next, when the battleship "Maine" will be again ready for sea. One of the important questions now before the Department is that concerning the proper boiler for battleships, and Acting Secretary Darling has notified the builders of large ships now under construction that the results of the tests to be made on the "Maine" will determine whether the Niclausse boiler will be used in future. The "Maine" will be sent on a long cruise, during which she will be run under forced and natural draft, and a special Board of Engineers, to be on board during the cruise, will make a report of the tests.

Temperature of Shops.

An English law requires that in all work shops proper measures be taken to maintain a proper temperature without interfering with the ventilation. It is interesting to note the decision of the English courts as to a proper temperature. In February last a clothing factory was accused. The rooms complained of were heated by steam pipes and the temperature was from 54 deg. to 61 deg., several gas jets being lighted. Judgment was given against the firm but reversed on appeal, several scientists testifying that a temperature of from 60 deg. to 65 deg. was a proper temperature.

Electric Roads in Indiana.

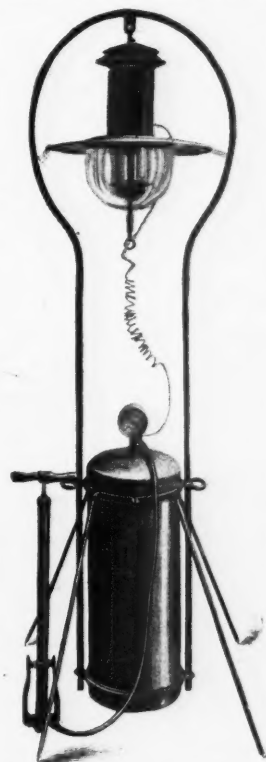
The total assessment value of the electric street and interurban railroads in Indiana on April 1, 1903, has been fixed by the Tax Board at \$12,013,762 divided as follows: \$10,313,795 for main track, \$144,547 for side track, \$1,177,135 for rolling stock, and \$378,285 for improvements to right-of-way. The figures are based on a mileage of 741.21 miles of main track and 48 miles of side track. The Indiana Union Traction Co. is assessed \$15,000 a mile and the other interurban lines from \$7,000 to \$11,000 per mile. Several new lines have been opened since April 1, the mileage and value of which is not included in these figures. There is now in operation nearly 1,000 miles of road worked by electric power.

White Pine.

There was probably no forest in the world so immense, so accessible, so easy to lumber, and so regular in the high quality of its timber as was the great pinery which occupied the region of the Great Lakes and of the upper Mississippi. The forests of Michigan, Wisconsin, and Minnesota originally contained a stand of about 350,000,000,000 ft. Of this Michigan had about 150,000,000,000; Wisconsin, 130,000,000,000, and Minnesota about 70,000,000,000 ft. Lumbering began in Michigan and Wisconsin during the thirties, and was of small importance until the early seventies. Since then the great pinery has been cut over in a way unprecedented in lumbering. In 1873 the cut was about 4,000,000,000 ft. It reached high-water mark in 1892, when it was over 8,500,000,000 ft. Since then it has steadily fallen, and in 1902 it was a little over 5,000,000,000. To the enormous total of about 188,000,000,000 ft. cut in the last 30 years there must be added about 28,000,000,000 ft., or 15 per cent., for laths, shingles and minor produce, making a total of 216,000,000,000 ft. Fifty billion ft. were probably cut prior to 1873, which would bring the total product of the Lake States to about 265,000,000,000 ft. As the estimate of the original stand amounted to about 350,000,000,000 ft., it would seem that after the cut of 1902, exclusive of second growth, there were 85,000,000,000 ft. standing. There are, however, by careful estimate, not more than 35,000,000,000 ft. of merchantable timber, which also includes undoubtedly a considerable amount of second growth. Of the vast discrepancy only a part can be put down to error, since we know enough of the fire history of these States to ascribe the loss of 60,000,000,000 ft. to fire. These figures show that it is a safe and conservative statement that the end of the white pine is near, and that 10 years will see it disappear as an important factor in the lumber trade.

Contractors' Lamp.

This is a 2,000 candle power lamp which either stands on its



four legs or is hung up, whichever position gives the most advantageous light for the workmen on the out-of-door job. The oil tank holds five gallons of kerosene, and the hand operated air pump gives pressure to drive the oil to the vaporizer, through the hollow wire, which is about 3/32 in. diameter. Oil gas lamps have to be "needled" every six to seven hours, and this one has a patented needling device, the ring of which will be noticed, in the cut, below the globe. By a quarter turn of this ring the lamp is needled. The five gallons of oil runs the light for somewhat more than 60 hours. Incandescent mantles are used on the burners and of course these are fragile, but the makers have ingeniously arranged them so as to last several times as long as on ordinary gas burners, and to get rid of the slight explosion

when lighting up. With these improvements their brilliant lighting justifies their use. The vaporizer needs cleaning after about 350 hours of burning, and an extra vaporizer is kept on hand for quick substitution. It is made by the Arthur Light Co., of 117 Walker street, New York city.

THE SCRAP HEAP.

Notes.

The Louisiana State Railroad Commission has adopted a rule requiring railroads everywhere to switch cars for connecting roads.

The Wabash, the Missouri Pacific and allied lines, under the direction of Traffic Director A. C. Bird, are establishing a considerable number of new freight soliciting offices in Wisconsin.

California papers say that the Southern Pacific Company has just retired 35 employees on pensions. The announcement that pensions would be granted to superannuated employees of the Union Pacific and the Southern Pacific and allied lines was given in the *Railroad Gazette* of Dec. 5 last.

A press despatch from Altoona, on Monday last, says that 400 employees in the shops of the Pennsylvania Railroad in that city have been laid off for an indefinite period. It was reported a few weeks ago that the Pennsylvania was laying off men in the station department, on ferry boats, etc., one day in a month.

The so-called Lincoln car, the armored passenger car which was built for President Lincoln in 1864, which carried the President's body from Washington to Springfield, after his death, and which has been standing for years in the Union Pacific yard at Omaha, has been sold, to persons who will exhibit it at St. Louis next year.

The New York, New Haven & Hartford and the Pennsylvania Railroads will reduce the running time of the through night train from Boston to Washington to 13 hours and 45 minutes. The New Haven road will reduce its time between Boston and Harlem River 50 minutes, and the Pennsylvania between Jersey City and Washington 70 minutes.

On a wire between New York and Philadelphia the Western Union Telegraph Company is now paying operators by the piece. A sender and receiver, working together, who have handled 325 messages in a day, have finished the day's work required by their regular monthly salary; and all messages handled above that number on that day are paid for at the rate of one cent a message to each man.

On Thursday, August 13, the Pennsylvania carried from Pittsburg to Philadelphia, on its Atlantic City excursion, over 5,100 passengers. The large majority of these passengers went in day cars, but there were also many sleeping and parlor cars. This is said to be the largest of the many annual excursions of this kind which have been run over the Pennsylvania Railroad. The round trip fare to Atlantic City is, we believe, \$10.

The Manhattan (Elevated) Railway, New York City, has established a telephone line connecting all of its stations. The wires for most of the way are carried in lead-covered cables suspended from the structure which supports the railroad tracks. The number of telephones is about 300. It is possible that the establishment of this means of communication will be followed by the abandonment of the Morse telegraph, with which the road is equipped.

The railroads centering in St. Louis have agreed to put embargoes on freight for consignees in and around that city who receive cars on private sidings and who are unable to take the shipments as fast as they arrive. It is said that this unusual action has been made necessary by the delays which have been caused by the floods of a few weeks ago. Numerous industries were compelled to suspend work for days and weeks, but the shipments of coal and other bulky goods for them have continued to come from the shipping points in the ordinary volume day by day.

Money-orders, as well as other messages, seem to take to the wireless telegraph like ducks to the water. A passenger on the Cunard steamer "Campania" recently sent a wireless message to the steamer "Lucania," going in the opposite direction, whilst in the middle of the Atlantic, with a request to a passenger on that boat that the purser of the "Campania" be authorized to pay him \$50. In the course of an hour the purser received an order to this effect, and the money was paid as directed. In this case the person who was "strapped" appears to have been a reputable citizen; but the purser had better be on his guard. If Marconigrams are going to fly about with this remarkable facility, the only proper regulation for ocean-steamer gamblers will be to put them in irons.

The Working Classes in England.

From figures recently published it appears that in England there are 10,156,976 men and boys employed in work of one description or another, that is to say 837 per 1,000 male citizens above 10 years of age. The number of women and girls finding employment amounts to 4,171,751, showing a decrease from the last census, while the number of employed males has increased.

The British Street Railroad Traffic Commission.

The sub-committee of the Royal Commission on street railroad traffic in London, appointed in July to study American street railroads, will sail for New York September 18. The commissioners will be shown the New York system by H. H. Vreeland, and will then visit Boston, Chicago and other places. The committee consists of Lord Ribblesdale, George S. Gibb, Sir David Barbour, Sir J. Dickson Poynder and Sir Francis Hopwood.

National Car Line.

The Hammond Refrigerator, the Anglo-American Refrigerator, the Kansas City Refrigerator, the Omaha Packing, and the St. Louis Dressed Beef & Provision

Companies' car lines have been combined under the name of the National Car Line, with a capital of \$1,000,000. The general offices will be in Chicago. The officers are: President, J. P. Lyman; Vice-President, S. A. McLean; Secretary and Treasurer, J. D. Standish. The consolidation gives one company control of the principal refrigerator car lines used in the transportation of fresh meats and provisions.

Accident Compensation in France.

The French courts have just decided a curious case of compensation. A workman having only one eye lost the sight of the other by an accident. Although the court recognized that he was totally incapacitated from working he was only allowed compensation for a partial disablement on the ground that if he had had normal vision before the accident he would have only been partially disabled by the loss of one eye. This was reversed on appeal, the Superior Court holding that the condition of the man before the accident had but little bearing on his state after the accident and hence on the compensation he should receive.

Two Kinds of Good Resolutions.

The Anthracite Board of Conciliation has resolved that—

"Whereas, Strikes are occurring throughout the Anthracite region in violation of the terms of the award of the Anthracite Coal Strike Commission, which was accepted by both employer and employee; and,

"Whereas, The Board of Conciliation has ruled that it will not take up or consider any question referred to it unless the employees return to work with the understanding that if the Board of Conciliation decides that the grievances are justifiable the adjustment shall be retroactive.

"Therefore, Be it resolved that where a strike has occurred or shall occur in any colliery coming under the award, the organization representing the majority of the mine workers shall insist that the employees of the particular colliery where said strike shall have occurred return to work, and as a penalty for having violated the provisions of the award the grievances shall not be adjusted by the Board of Conciliation."

Resolutions by William Renshaw Dir., B. L. E.

Whereas, The engineers of the Yazoo & Mississippi Valley Railway had not asked anything of their company for a space of 10 years, and

Whereas, . . . the adjustment committee was authorized to revise the schedule of wages, and called upon the highest officers in the city of Chicago and were treated with much kindness, courtesy and fair dealing; therefore, be it

Resolved, That we tender a vote of thanks to the Second Vice-President, the General Manager, and the Superintendent of Machinery. . . . Such treatment should be the means of building their engineers up to the highest moral standing. . . .

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvi.)

The Railway Signaling Club.

The Secretary announces that on Tuesday, Sept. 8, the regular date for the first fall meeting of the club, two meetings will be held, one in New York and one in Chicago. Further announcement will be made next week.

Pacific Northwest Society of Engineers.

The annual convention of the Pacific Northwest Society of Engineers was held August 6 to 8. The headquarters were at Seattle, Wash. The first meeting was held at the Parliament building, Victoria, B. C. Addresses of welcome were made by A. T. McCandless, Mayor of Victoria, and Charles Hayward, President of the Tourists Association. The annual address was made by President R. H. Thomson. Mr. C. H. Topp, City Engineer of Victoria, gave a paper on "Victoria Municipal Improvements," illustrated by stereopticon. The party inspected the improvements which have been started at James Bay, where a stone retaining wall is building. The 20 in. hydraulic dredge, "King Edward VII," was in operation. Other points of interest visited were the Government buildings and the Navy Yard and Esquimalt, including the great stone dry dock, shop buildings and warships.

Western Society of Engineers.

The following is the programme for the Western Society of Engineers from September, 1903, to January, 1904: Sept. 2, Mr. L. B. Merriam, M. W. S. E., "Development of Coal and Coke Industry of Colorado Fuel & Iron Co."; Sept. 16, Mr. G. H. Kimball, of New York, "A Combination Steel and Concrete Railroad Cross-Tie"; Sept. 30, Mr. T. T. Johnston, M. W. S. E., "Hydro-Electric Power Development at Joliet, Ill."; Oct. 7, Prof. A. Marston, M. W. S. E., "Sewage Disposal in Iowa"; Oct. 21, Prof. Bull, M. W. S. E., "The Use of Superheated Steam"; Nov. 4, Mr. G. A. M. Liljencrantz, M. W. S. E., "The Haskell Self-Registering Water Gage"; Nov. 18, Mr. H. Wiederhold, of Philadelphia, "Asphalt and Bitumen, and Its Use in Structural Work"; Dec. 2, Mr. A. J. Mason, M. W. S. E., "The Movement of Iron Ore on the Great Lakes"; Dec. 16, Mr. W. H. Pearce, M. W. S. E., "Heating From a Central Station"; Jan. 5, 1904 (Tuesday), annual meeting and dinner; Jan. 20, Mr. E. E. Ellis, M. W. S. E., "Railroad Signaling." J. H. Warder, 1737 Monadnock block, Chicago, Secretary, W. S. E.

PERSONAL.

—Mr. Don Alexander, General Manager of the Blue Ridge Despatch, died at Cincinnati, Ohio, on August 9, at the age of 43. Mr. Alexander entered railroad service at St. Louis in 1880, and served in the employ of the Cairo Short Line, the Missouri Pacific and other companies. In 1895 he was appointed Assistant General Freight Agent of the Cincinnati, New Orleans & Texas Pacific, and a year later took a similar position on the Chesapeake & Ohio. He resigned the last position on Jan. 1, 1898, to become General Manager of the Blue Ridge Despatch.

—Mr. W. C. Franz, who has been appointed Superintendent of the Kanawha & Michigan to succeed W. G. Christmas, resigned, is 32 years old. His first railroad service was on the Toledo & Ohio Central as caller and yard clerk in 1889. After six months' service he was made clerk in the Trainmaster's office. In 1891 he was made chief clerk to the Superintendent. He held that position for nine years, and in 1899 was appointed Trainmaster of the Eastern Division of the Toledo & Ohio Central, with headquarters at Bucyrus, Ohio. In 1901 he accepted the appointment as Trainmaster of the Hocking Valley and remained there until the present time.

—Mr. W. L. Darling, the new Chief Engineer of the Chicago, Rock Island & Pacific, was born at Oxford, Mass., in 1856. He was graduated from the Worcester Polytechnic Institute and entered railroad service in 1879. From that date until 1883, he was successively Resident and Locating Engineer on the Northern Pacific. In 1883 he became Resident Engineer of the St. Paul & Northern Pacific, and the following year was appointed Locating Engineer on the Chicago, Burlington & Quincy. In 1887 he was appointed Chief Engineer of the Duluth, Watertown & Pacific, and in 1889 went back to the Northern Pacific as Assistant Engineer. He has remained with this road until the present time, and has held successively the positions of principal assistant engineer, assistant chief engineer, and chief engineer.

—Mr. A. L. Moler, who has recently been appointed Superintendent of Motive Power of the Chicago, Cincinnati & Louisville,

was born at Dayton, Ohio, in 1863. He was graduated from Ohio State University at the age of 20, and entered the service of the Chicago, Rock Island & Pacific as machinist apprentice. He was subsequently employed for eight years as locomotive engineer on the Louisville & Nashville, the Chicago, Burlington & Quincy and the New York & Ottawa Railroads. Later he went to the

Baldwin Locomotive Works, where he remained two years, after which he entered the service of the Chicago & Alton, first on special work at Bloomington, and later as general foreman in charge of the Locomotive and Car Department at Chicago. After this he went to the Macon, Dublin & Savannah as Superintendent and Master Mechanic. He resigned his position with that company to go to the Vicksburg, Shreveport & Pacific, where he built some large shops. From this road he went to the place which he now holds.

—Mr. John F. Stevens, Chief Engineer of the Chicago, Rock Island & Pacific, has been appointed Fourth Vice-President of the company. He was born at West Gardiner, Me., in 1853, and began his railroad service in 1876 as Chief Engineer of the Sabine Pass & Northwestern Railway. In the next 14 years he acted in the capacity of Assistant Engineer for the following roads: The Sabine Pass & Northwestern, the Denver & Rio Grande, the Chicago, Milwaukee & St. Paul, the Canadian Pacific, the Duluth, South Shore & Atlantic and the Spokane Falls & Northern. In 1890 he became Principal Assistant Engineer of the Great Northern, and five years later was appointed Chief Engineer of the same road, where he remained until March of the present year, when he accepted the position of Chief Engineer of the Rock Island.

—Mr. Dan Parmelee Eells, who recently died at his home in Cleveland, Ohio, was born at Westmoreland, Oneida County, N. Y., April 16, 1825. During a life of varied activity, Mr. Eells was connected with many railroad and financial enterprises. He took part in the organization of the Lake Erie & Western, and was identified with the Seney syndicate in building the Toledo & Ohio Central and the New York, Chicago & St. Louis Railroads. He was connected, at different times, with the Detroit, Mackinaw & Marquette, the Kanawha & Ohio, the Munising Railroad, the Mahoning Coal Railroad and the East Tennessee, Virginia & Georgia. Mr. Eells was long Vice-President or President of the Commercial National Bank of Cleveland, and until his retirement on account of ill health in 1897, was a director in many Cleveland companies. He was also closely identified with street railroads in Cleveland, and in connection with Senator Hanna, he organized the Cleveland City Railway. At the time of his death he was trustee of Oberlin College, Lake Erie College, Painesville, Ohio, and the Lane Theological Seminary, Cincinnati.



ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—See Colorado & Southern.

Baltimore & Ohio.—J. A. Kirkpatrick has been appointed Master Mechanic at New Castle Junction, Pa., in place of H. B. Knight, resigned.

Canadian Pacific.—The Board of Directors of this company has been enlarged from 10 to 15 members by the addition of G. A. Drummond, R. G. Reid, David McNicoll, C. W. Mackay and Robert Mackay. Mr. McNicoll is Second Vice-President and General Manager of the road.

Chicago & Alton.—C. E. Fuller, Assistant Mechanical Superintendent of the Erie, has resigned and accepted the position of Superintendent of Motive Power of the Chicago & Alton. This change is to be effective Aug. 24.

Chicago, Milwaukee & St. Paul.—A new office, Superintendent of Terminals, has been created by this company at Kansas City, Mo. P. C. Hart, hitherto Trainmaster of the Wisconsin Valley Division, has been appointed to fill the place.

Colorado & Southern.—Henry Giegoldt, formerly Master Mechanic of the Atchison, Topeka & Santa Fe at La Junta, Colo., has resigned and accepted a similar position with the Colorado & Southern at Trinidad, Colo.

Erie.—H. E. Huntington has been appointed Division Passenger Agent, with office at Elmira, N. Y., succeeding W. G. MacEdward, resigned.

Fort Smith & Western.—H. A. Schwanecke has been appointed Chief Engineer, to succeed F. W. Bond, deceased. Mr. Schwanecke's office is at Fort Smith, Ark.

Great Northern.—George Bruce has been appointed Master Mechanic, with headquarters at Superior, Minn., succeeding G. A. Gallagher. G. M. Winney has been appointed to succeed Mr. Bruce, with headquarters at Willmar, Minn.

Lake Erie & Detroit River (Pere Marquette).—W. K. Christie, Master Mechanic of the Pere Marquette at Saginaw, Mich., has also been appointed Master Mechanic of the Lake Erie & Detroit River, with headquarters at Walkerville, Ont., succeeding S. Austin.

Minneapolis, St. Paul & Sault Ste. Marie.—J. R. Michaels has been appointed Assistant Superintendent at Glenwood, Minn.

Missouri, Kansas & Texas.—A. E. Boughner, formerly Assistant Superintendent at Parsons, Kan., has been appointed Superintendent of the Missouri, Kansas & Texas at Oklahoma City, Okla. T.

Missouri Pacific.—W. S. Carson, hitherto Superintendent of Terminals at Kansas City, Mo., has been transferred to a similar position at Little Rock, Ark., and J. L. Gogerty, Superintendent of Terminals at Little Rock, has taken Mr. Carson's place at Kansas City.

Mobile, Jackson & Kansas City.—W. W. Hayden, formerly Assistant Engineer of the Yazoo & Mississippi Valley at Memphis, Tenn., has resigned and accepted the position of Assistant to President W. D. Stratton, of the Mobile, Jackson & Kansas City.

Philadelphia, Baltimore & Washington.—T. J. Stewart has been appointed Engineer of Construction, with headquarters at Chester, Pa.

Seaboard Air Line.—B. F. Yoakum, H. Clay Pierce and B. S. Guinness have been elected voting trustees of this company, in place of J. W. Middendorf, R. C. Davidson and S. D. Warfield, retired.

B. F. Yoakum, H. Clay Pierce, B. S. Guinness, Oakleigh Thorne and F. B. Van Vorst have been elected directors of this company in place of E. B. Addison, W. W. Mackall, R. C. Davidson and F. R. Pemberton, retired.

Southern.—C. C. Hodge has been appointed Trainmaster on the Knoxville Division, to succeed J. H. Stanfield. Mr. Stanfield succeeds C. R. Wescott, resigned, with headquarters at Knoxville, Tenn.

M. M. Albright has been appointed Trainmaster of the Blumont Branch.

Tennessee Central.—At a special meeting of the stockholders of this company on August 6, the Board of Directors was increased from seven to nine members. The new directors elected were William Hume and John A. Pitts. Mr. Pitts is General Counsel of the company.

Yazoo & Mississippi Valley (Illinois Central).—See Mobile, Jackson & Kansas City.

LOCOMOTIVE BUILDING.

The *Pere Marquette* has ordered six locomotives from the Brooks Works.

The *Evansville & Terre Haute* is having three locomotives built at the Baldwin Works.

The *Terre Haute & Indianapolis* is having 13 locomotives built at the Schenectady Works of the American Locomotive Co.

F. M. Hicks, of the Hicks Locomotive & Car Works, has orders to build the following locomotives: Elwood, Anderson & Lapel R. R., one switching engine; Louisville & Atlantic, one freight locomotive; Cherokee Construction Co., one 10-wheel locomotive; West Virginia & Southern R. R., one 10-wheel locomotive.

The *Union Pacific* has ordered 10 simple Atlantic (4-4-2) locomotives from the Baldwin Locomotive Works. The locomotives will weigh 180,000 lbs., with 100,000 lbs. on the drivers; cylinders 20 x 26 in.; 84 in. drivers; wagon top boilers, with a working steam pressure of 200 lbs.; heating surface, 3,243.5 sq. ft.; fire-box, 102 in. long and 66 in. wide; tank capacity, 7,000 gallons of water and 12 tons of coal.

The *Erie* has ordered 45 simple consolidation (2-8-0) locomotives from the Schenectady Works of the American Locomotive Co. These locomotives will weigh 200,000 lbs., with 180,000 lbs. on drivers; cylinders, 22 in. x 32 in.; diameter of drivers, 62 in.; straight top wide fire-box boiler, with a working steam pressure of 200 lbs.; 374 tubes 2 in. in diameter and 16 ft. long; fire-box, 102½ in. long and 75¼ in. wide; grate area, 53.35 sq. ft.; tank capacity, 7,000 gal. of water, and coal capacity, 12 tons. The company has also ordered 30 simple six-wheel switching (0-6-0) locomotives from the Cooke Works of the American Locomotive Co. These locomotives will weigh 150,000 lbs.; cylinders, 20 in. x 26 in.; straight top wide fire-box boiler, with a working steam pressure of 180 lbs.; 300 tubes 2 in. in diameter and 12

ft. 6 in. long; fire-box, 114 in. long and 66 in. wide; grate area, 52.25 sq. ft.; tank capacity, 4,500 gallons of water, and coal capacity six tons. The company has also ordered 50 simple (2-8-0) locomotives from the Rogers Locomotive Works. These locomotives will weigh 200,000 lbs., with 180,000 lbs. on drivers; cylinders, 22 in. x 32 in.; straight top wide fire-box boiler, with a working steam pressure of 200 lbs.; heating surface, 3,394 sq. ft.; 380 tubes, 2 in. in diameter and 16 ft. long; fire-box, 108 in. long and 75 in. wide; grate area, 56.25 sq. ft.; tank capacity, 7,000 gallons of water, and coal capacity 12 tons.

CAR BUILDING.

The *Pullman Company* is building 25 coaches for general service.

The *Atchison, Topeka & Santa Fe* is reported to be in the market for 10 express cars.

The *Chesapeake & Ohio* is having 200 freights built at the Huntington Works of the American Car & Foundry Company.

The *Arkansas & Southern* has ordered 30 flat cars of 60,000 lbs. capacity from the American Car & Foundry Co., for October delivery. The cars will be 36 ft. long, 8 ft. 9 in. wide, and standard height, with wooden frames and underframes. The special equipment includes: Westinghouse air-brakes.

The *Chesapeake & Ohio*, as reported in our issue of July 31, has ordered three coke cars of 60,000 lbs. capacity, and 14 hopper bottom gondolas of 80,000 lbs. capacity, from the American Car & Foundry Co. The coke cars will weigh 32,374 lbs., and will be 38 ft. 1½ in. long and 8 ft. 9 in. wide over end sills, with wooden frames and underframes. The gondolas will weigh 34,268 lbs., and will be 28 ft. long, 8 ft. 6 in. wide over end sills, and 7 ft. high, with wooden frames and underframes. Special equipment for both includes M. C. B. iron axles, Diamond brake-beams, Corning brake-shoes, Westinghouse air-brakes, Atlantic Brass Co.'s brasses, Tower couplers, C. & O. Railway Co. door fastenings, Miner draft rigging, gray iron M. C. B. journal boxes, Morris pressed steel journal box lids, rigid arch bar trucks and American Car & Foundry Co.'s wheels.

BRIDGE BUILDING.

ALLENTOWN, PA.—The viewers appointed to report on a bridge connecting the Sixth and Tenth Wards have estimated the price for the structure at Allen street at \$40,000; at Tilghman street the probable cost will be \$120,000.

ARMOUR, S. DAK.—Bids are wanted Sept. 1, by Ruel E. Dana, County Auditor, for building a steel bridge over Twelve-Mile Creek in Berlin Township; also for one over Choteau Creek in Valley Township.

BATTLE CREEK, MICH.—The Jeff's bridge over Battle Creek will be replaced with a steel and cement structure to cost about \$20,000.

BELWOOD, GA.—Petition has been presented to the County Commissioners asking for a bridge over the railroad tracks at Boss street.

BERRYVILLE, VA.—The Clark County Commissioners have awarded a contract, it is reported, to Nelson & Buchanan, of Chambersburg, Pa., to build two steel bridges over the Shenandoah River at Castleman's and Berry's ferries, at a total cost of \$39,000.

BOSTON, MASS.—It is reported that the city will spend \$56,000 for widening drawbridges at Fort Point channel.

BUCTOCHE, N. B.—The contract has been awarded to J. C. D. Simmons, of St. Mary's, for the stone substructure of a bridge at this place, to cost about \$22,000.

CANTON, N. Y.—Plans are being prepared, it is reported, for a stone arch bridge at this place about 120 ft. long, and bids will soon be asked. Address F. J. Wheeler, Town Clerk.

CINCINNATI, OHIO.—The Hamilton County Board of Control has approved the action of the County Commissioners in appropriating \$200,000 to build a bridge near Cleves over the Miami River, to take the place of the old "Lost Bridge."

CLINTON, IOWA.—Recent storms in Cerro Gordo County damaged bridges to the extent of \$10,000.

COBOURG, ONT.—Separate bids are wanted Aug. 26, by Neil F. MacNachtan, County Clerk, for the abutments and concrete, also for the steel superstructure of a highway bridge 100 ft. long over the Pigeon River between the townships of Cartwright and Manvers, near Janetville.

COLORADO SPRINGS, COLO.—The City Engineer may soon ask bids for some concrete bridge work at Costilla street; also at South Tejon street, the total cost of which will be about \$9,000.

DANVERS, MASS.—A contract has been awarded to Thomas Fitzgibbons, of Beverly, by the Essex County Commissioners, to build a concrete arch bridge 70 ft. wide over the Waters River, to cost about \$23,000.

DEHL, MINN.—Bids will be received, reports state, Sept. 21, for building a steel bridge over Minnesota River. Address the County Auditor at Redwood Falls.

DULUTH, MINN.—It is reported the Modern Steel Structural Company of Waukesha, Wis., bid \$100,000 for building the ferry bridge across ship channel, with an allowance of \$600 for foundations constructed.

EATON, OHIO.—Bids are wanted Aug. 26, by the County Commissioners, for building two abutments of a bridge over Twin Creek, in Twin Township. Bids are also wanted Aug. 27 for building the steel superstructure of the same bridge which is to be a Pratt truss bridge 175 ft. long, 25 ft. high and 16 ft. roadway. Address R. K. DeMotte, Engineer.

EAU CLAIRE, WIS.—The City Council may soon ask bids for a steel plate girder bridge at North Barstow street, to cost about \$25,000, or a steel concrete arch bridge to cost about \$30,000.

EDMONTON, ALBERTA.—Surveys are being made by the Canadian Pacific for a bridge between this place and Strathcona.

FREDERICA, DEL.—Bids are wanted Sept. 1 for a buckle plate steel bridge over Spring Creek near this place. Address J. V. McCombs, Clerk of the Peace.

GIRARD, KAN.—Crawford County will want some steel bridges at about \$5,500, for which bids are asked Sept. 11 by John Viets, County Clerk.

GLEN COVE, N. Y.—The building of an iron highway bridge across the lower lake at South Glen Cove, to cost about \$20,000, is being considered by the Board of Supervisors.

GRASS VALLEY, CAL.—Bids are wanted Sept. 21, by F. L. Arbogast, County Clerk, for a steel bridge over Deer Creek at the Anthony House.

GREECE, N. Y.—A committee has been appointed by the Board of Supervisors to secure plans for and estimate the cost of a bridge over Genesee River between this place and Irondequoit.

HAGERSTOWN, MD.—Contract has been awarded to S. P. Angle to furnish stone culverts and bridges at \$40,000 for the Wabash R. R. extension.

HAMILTON, MONT.—Bids are wanted Sept. 10, by the County Commissioners for two combination bridges over Bitter Root River, of 125 ft. and 100 ft. respectively. C. M. Johnson, Clerk of the Board.

HOUSTON, TEXAS.—The Board of Freeholders are considering the building of a bridge across Buffalo Bayou, between the Second and Third wards, to cost about \$20,000.

INDIANAPOLIS, IND.—The Consolidated Traction Company, it is reported, has awarded the contract for eight steel bridges between Indianapolis and Crawfordsville to the Lafayette Engineering Company.

The question of a new bridge over Fall Creek is being agitated by the residents of the northwestern section of the city.

Bids may soon be asked for a new bridge at Washington street.

IOWA CITY, IOWA.—It is reported that Smith & Downs, promoters of interurban railroads, have awarded the contract to the American Bridge Company of New York for three bridges between Iowa City and Cedar Rapids.

KANSAS CITY, KAN.—Contract has been awarded to the Missouri Valley Bridge & Iron Works of Leavenworth, Kan., for building the Turner bridge, at \$33,995. It is also reported contract has been awarded to A. McLouth, of McLouth, Kan., for the Bonner Springs bridge for \$22,517.

KANSAS CITY, MO.—Press reports of Aug. 18 state that the James street bridge has been carried away by high water in the Kansas River. Part of the Belt Line bridge was swept away.

KNOXVILLE, TENN.—Doyle, Fenton & Co. are said to have contracts for the masonry work of five railroad bridges over Clear Fork River.

The Southern Railway, reports state, will rebuild its bridges on the line between Jellico, Tenn., and Asheville, N. C., one of the largest of which is located at Clinton, Tenn.

LEAVENWORTH, KAN.—The County Commissioners have appropriated \$22,000 to build bridges over Kaw River.

McKEESPORT, PA.—It is stated John Waters, of this place, has secured the contract to build a steel bridge over White Hollow at about \$35,000.

NEWARK, N. J.—Improvements at this place to be made by the Delaware, Lackawanna & Western include the elimination of a large number of grade crossings. A number of viaducts will be built to effect this.

The freeholders of Hudson and Essex Counties will be petitioned for a joint railroad and highway bridge over the Passaic River where the Center street bridge of the Pennsylvania Railroad is now located.

NEW MARTINSVILLE, W. VA.—Bids are wanted Aug. 24 for building a steel bridge over South Fork at Jacksonburg, to be 140 ft. long and 16 ft. wide, including the abutments; also for the stone abutments of a bridge at Smithfield. Address I. D. Morgan, Wetzel County Court Clerk.

NORRISTOWN, PA.—Plans for a steel bridge over Mill Creek in Lower Merion Township have been approved by the County Commissioners.

ORELAND, PA.—The County Commissioners will build a bridge at this place over the Philadelphia & Reading track to replace the one recently removed because of its unsafe condition.

PERU, IND.—Bids are wanted Aug. 24, it is reported, for building 25 steel bridges, with stone abutments; also for concrete arches. C. W. Macy, County Auditor.

PORTLAND, ORE.—By the collapsing of the Morrison street bridge, the city will be compelled to ask bids immediately to replace the structure with a steel bridge, for which an expenditure of \$400,000 was authorized last winter by the Legislature.

The Portland Railway Co. will soon award a contract for a steel bridge 45 ft. wide over Jefferson street.

PRINCE ALBERT, N. W. T.—The town will contribute \$25,000 towards building a bridge across the Saskatchewan River.

READING, PA.—Bids are wanted Aug. 28, by Berks County, for a steel bridge 140 ft. long at Angelica, and for a 40-ft. steel bridge at Marysville.

SEATTLE, WASH.—The Great Northern is building seven steel bridges between the Cascade tunnel and Seattle, Wash.

STREATOR, ILL.—Plans and estimates for a new bridge at Main street, on which action will shortly be taken, include a 570 ft. steel span and an embankment, all costing from \$58,000 to \$78,000.

TOPEKA, KAN.—Bids will soon be asked by Shawnee County for the rebuilding of bridges at Sardon avenue, the brick plant, Valencia and Rossville, plans for which are being prepared, or for the building of new bridges.

Shawnee and Jefferson Counties, it is reported, will share the cost of rebuilding Granville bridge at about \$15,000.

TRENTON, N. J.—Contracts have been awarded the Berlin Construction Company by Mercer County to build four steel bridges at an aggregate cost of \$19,800.

WASHINGTON, D. C.—Gen. Gillespie, Chief of Engineers U. S. Army, has approved the recommendation of Col. Allen, the Army engineer officer in charge of Potomac River improvements at Washington, that the bid of the Pennsylvania Steel Company to build the highway bridge across the Potomac River be accepted, and the recommendation is now before the Secretary of War for final action. The bid of the Pennsylvania Steel Company is for a through truss bridge similar to the new Long bridge of the Pennsylvania Railroad now under construction. The plans provide for a steel truss bridge 2,666 ft. long between end pins, with 11 fixed spans and one draw-

span supported on 12 piers and two abutments of concrete and granite masonry, all with concrete and pile foundations. From the Washington end the first span will extend over Potomac Park 100 ft., leaving space for a drive and foot-way along the river underneath. The roadway on the bridge will be 40 ft. wide with two sidewalks each 8 ft. wide with ornamental iron or steel railings. Double tracks for an electric railroad with overhead trolley will be laid across the bridge by the contractor. The draw will be worked by an electric motor. With a sheet asphalt pavement the bridge will cost \$914,200, or with a temporary wooden plank floor \$879,200, exclusive of approaches. (July 31, p. 561.)

WILLIMANTIC, CONN.—The special bridge committee report that the price of a bridge over the Willimantic River at this place will vary according to location from \$20,000 to \$50,000, including the approaches. They also say that the probable cost of eliminating grade crossings in the city will be about \$200,000.

WOONSOCKET, R. I.—Bids were opened July 27 by Frank H. Mills, City Engineer, for rebuilding the Globe arch bridge at South Main street, and contract has been awarded to C. W. Blakeslee & Sons, Fall River, Mass., who bid for total repairs with concrete parapet, \$32,429; with iron fence, \$30,627. Other bids were F. E. Shaw, Providence, \$38,908, \$37,312; Fletcher & Lahey, Boston, Mass., \$47,337, \$46,256; Cenedella Bros., Milford, Mass., \$47,762, \$47,248.

Other Structures.

BRIDGEPORT, CONN.—The New York, New Haven & Hartford has awarded a contract to Wm. Paterson, of New Haven, for building a temporary station at this city. It will be 25 ft. x 200 ft., for use while the new station is being built.

CINCINNATI, OHIO.—The Chicago, Cincinnati & Louisville, it is reported, is having plans prepared for a large passenger station and for freight houses at Cincinnati.

DULUTH, MINN.—The Northern Pacific, reports state, will build a new station at Twentieth avenue as soon as permission can be obtained from the city.

HAMMOND, IND.—The Chicago, Indianapolis & Louisville, it is stated, has plans prepared for a 12-stall roundhouse, to cost about \$35,000, to be built at this place.

HELENA, MONT.—It is reported that the Northern Pacific will build a 300 ft. x 40 ft. station at Helena.

EAST ST. LOUIS, ILL.—The Wabash, it is stated, is preparing plans for a freight house to be 1,200 ft. long and 24 ft. wide.

GUELPH, ONT.—The Grand Trunk Railway has made a proposition to the city council to build a new station here.

KALAMAZOO, MICH.—Plans have been prepared, it is said, for a roundhouse to cost about \$20,000, for the Michigan Central.

KNOXVILLE, TENN.—The Southern Railway, reports state, will enlarge its machine shops. A building 175 ft. x 125 ft. is to be built and a traveling crane put in.

LATONIA, KY.—New shops may soon be built at this place for the Louisville & Nashville, reports state, at a cost of \$50,000.

McKEE'S ROCKS, PA.—The Pittsburg & Lake Erie, it is stated, has plans ready for two new buildings, to cost about \$35,000. W. F. Trimble & Co., reports say, has the contract.

MEMPHIS, TENN.—It is said that a union railroad station will be built at Memphis.

MONTEREY, MEXICO.—The National of Mexico, it is stated, will build a new passenger station at this place to cost about \$46,000.

NEW ALBANY, IND.—It is reported a malleable iron foundry is to be built by Geo. D. Todd, of the Todd Mfg. Co. A number of Louisville capitalists are also interested.

NEW ORLEANS, LA.—The Texas & Pacific has asked permission to extend its sheds.

NEW YORK, N. Y.—Local papers report that the New York Central has bought the building at the northwest corner of 125th street and Park avenue, adjoining the company's tracks (elevated) in the avenue. It is a six-story structure on a plot 49.11 ft. x 90 ft. According to report, the company will remodel the building for a station. The present station, beneath the elevated structure which support the tracks, is small.

SAN BERNARDINO, CAL.—The Southern Pacific, reports state, will build a station 58 ft. x 80 ft.

SHERMAN, TEXAS.—New shops may soon be erected here by the St. Louis & San Francisco.

TACOMA, WASH.—It is reported that a large car building plant will soon be built at this place, and that it will be incorporated with a capital of about \$200,000, under the name of the Pacific Car Works.

WACO, TEXAS.—The St. Louis Southwestern is considering the building of a large station at this place.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

AMARILLO, PLAINVIEW & SOUTHERN.—Articles of incorporation have been filed by this company in Texas to build from Amarillo south through the Counties of Randall, Swisher and Hale to Plainview, 75 miles. J. M. Donohue is President, and R. P. Smith, Secretary, both of Amarillo, Texas.

ATLANTA, BEAUFORT & GAINESVILLE (ELECTRIC).—This company has been incorporated in Georgia to build an electric railroad from Gainesville southwest via Beaufort, Suwanee, Duluth and Norcross, to Atlanta, 58 miles. C. C. Sanders, Gainesville; M. S. Garner, Beaufort; D. B. Sandcliff, Atlanta, and others are incorporators.

BALTIMORE & OHIO.—Press reports state that this company is making surveys for a new line from Confluence, Pa., west to Cameron, W. Va., where connection will be made with the main line of the Baltimore & Ohio.

BEAUMONT, SOUR LAKE & PORT ARTHUR TRACTION.—This company has been incorporated in Texas, to build an electric railroad from Port Arthur northwest to Beaumont, 20 miles, and eventually to Sour Lake. The new line will parallel the Gulf & Interstate between Port Arthur and Beaumont. G. W. Meeke, Houston; G. W. Carroll, Beaumont, and others are incorporators.

CASPAR, SOUTH FORK & EASTERN.—An officer writes that surveys are now in progress for this proposed road

from Caspar, Cal., east to Willits, Mendocino County, 35 miles. R. E. Andrews, Caspar, Cal., is Chief Engineer. (July 24, p. 537.)

CHICAGO & NORTH WESTERN.—A contract has been awarded to McIntosh Bros., Milwaukee, Wis., for building a branch line from Beaver, Mich., into timber lands, 10 miles.

CHICAGO GREAT WESTERN.—It is reported that important improvements will shortly be made on the main line between Oelwein, Iowa, and Kansas City. The roadbed will be rebalasted and 50 miles of track will be relaid with 85-lb. rails. Several steel bridges will be built to replace wooden bridges.

CHOCTAW, OKLAHOMA & GULF.—It is reported that this company will resume work on the extension from Amarillo, Texas, west to Las Vegas, N. Mex., where connection will be made with the Atchison, Topeka & Santa Fe. The line was originally projected to Tecumseh, but since a trackage agreement has been effected with the Santa Fe, the proposed route of the extension has been changed. (Feb. 27, p. 160.)

COLUMBUS, PENSACOLA & MEMPHIS.—Application has been filed by this company for a charter to build a railroad from Columbus, Miss., north to Aberdeen, 25 miles. The new line will connect with the Illinois Central at Aberdeen. Names of incorporators are not stated.

DALLAS, CLEBURNE & SOUTHWESTERN.—It is reported that the plans of this company are now in such shape that work will be begun early in September, on the extension from Cleburne, Texas, to Glenrose, 25 miles. The road at present runs between Egan and Cleburne, 10 miles, and is projected to Dallas. Hurley & Denton, Cleburne, Texas, have the contract for the first section of the road. (July 24, p. 548.)

DECATUR, TUSCOLA & CHAMPAIGN.—Articles of incorporation have been filed by this company in Illinois. It is proposed to build from Decatur east to Tuscola, 35 miles, paralleling the Indiana, Decatur & Western between these two points. W. H. Black, D. L. Campbell, J. L. Ray, A. W. Wallace and others of Decatur, Ill., are incorporators.

FLORIDA GRAND TRUNK.—The newspapers say that plans have been finished for building this road from Dothan, Ala., through Tallahassee, Fla., and along the west coast of Florida, with a branch to St. Andrew's Bay. J. A. McLeay, Palm Beach, Fla., is interested.

GEORGETOWN & MOUNT PLEASANT.—This company has recently been chartered in South Carolina. It is proposed to build a railroad from Mount Pleasant to Georgetown, 45 miles. B. P. Miller, Chester, S. C., is President.

LEWISTON & OWYHEE.—An officer writes that surveys will be begun at once on this proposed road from Huntington, Ore., to Lewiston, Idaho, 200 miles. The company has purchased the right of way from the Northwest R. R., on which some work was done between Huntington and Lewiston several years ago but was stopped on account of the financial stringency. About 30 miles of the line has been graded. M. O. Reed, Colfax, Wash., is President; G. B. Baker, Dayton, Wash., Secretary. (Aug. 14, p. 594.)

LOUISA R. R.—This company has been incorporated in Kentucky to build a railroad from a point on the Big Sandy River, in Lawrence County, to Stratton's branch near Louisa, Ky., a distance of four miles. W. L. Watson, F. J. Dixon and others of Louisa are incorporators.

LOWVILLE & BEAVER RIVER.—This company has been incorporated in New York to build a railroad from Lowville to Croghan, 10½ miles, passing through New Bremen and Beaver Falls. C. D. Boshart, F. S. Easton, C. P. Leonard and others of Lowville, N. Y., are incorporators.

MADISONVILLE TRACTION.—This company has been incorporated in Kentucky, with power to build an electric railroad from Madisonville, via Earlington, to Nortonville, 18 miles. H. H. Huffaker, B. G. Huffaker and C. C. McClarty, Louisville, Ky., are incorporators.

MEXICAN ROADS.—Press reports state that the syndicate which recently purchased a large tract of land in the State of Tamaulipas, will build a railroad from its property to connect with the Mexican Central at Gonzales, Marion Butler, Monterey, Mexico, is said to be interested.

The Pittsburg-San Jose Reduction & Railroad Co. will build a railroad from its reduction works at San Jose del Sitio, south to connect with the Mexican Central and the Parral & Durango railroads. An extension will also probably be built north to Bocoyna to connect with the Kansas City, Mexico & Orient. M. B. Place, San Jose del Sitio, Mexico, is Vice-President and General Manager. (May 29, p. 384.)

MORELIA & PACAMBARO.—A subsidy of \$3,000 for every kilometer of road built has been granted this company by the Legislature of the State of Michoacan. Surveys have been completed and it is stated that work will shortly be begun. The proposed route is from Irapuato, on the Mexican Central, south to Morelia, and thence through Tacambaro west to Ario, 225 miles. (July 17, p. 534.)

OREGON, WASHINGTON & IDAHO.—This company has been incorporated in Oregon to build from Riparia, Wash., up the Snake River southeast to Lewiston, Idaho, 50 miles, with a branch to Birch Creek. W. H. Kennedy, Riparia, Wash., is said to be interested.

PENNSYLVANIA.—Contract has been awarded to H. S. Kerbaugh & Co., Philadelphia, for building two additional tracks between Latrobe, Pa., and Derry, 10 miles. A contract has also been awarded to the same firm for building the cut-off east of Bessemer, Pa. (May 22, p. 368.)

PHILADELPHIA RAPID TRANSIT.—Press reports state that work has been begun on the proposed elevated line of this company west of the Schuylkill River. Work on the subway section of this road between Market street and the Schuylkill River was begun in April of this year. Monks & Sons have the contract for the western section. (April 3, p. 256.)

QUINCY, CARROLLTON & ST. LOUIS.—An officer writes that, commencing with Aug. 10, the portion of this road lying west of Carrollton, Ill., and that between Carrollton and Columbia, 11 miles, will be abandoned; and trains will in future be run only between Litchfield and Carrollton, 46 miles.

RIO GRANDE WESTERN.—At a recent meeting, the directors of this company authorized the building of an extension from Marsyvale, Utah, south through Circleville, passing up the South Fork Canyon, to Parowan Valley. Surveys for this line have already been finished.

ST. LOUIS & KASKASKIA.—Articles of incorporation have been filed by this company in Illinois. It is proposed to build a line from East St. Louis, in an easterly

direction, crossing the Baltimore & Ohio Southwestern at Furmans, and continuing thence in a northeasterly direction to a point on the boundary line of St. Clair County. E. W. West, Jr., and H. R. Heimberger, of Belleville, Ill., and E. R. Rombauer, St. Louis, Mo., are incorporators.

SAN PEDRO, LOS ANGELES & SALT LAKE.—The Utah Construction Co. has taken a contract for grading 85 miles of the 130-mile extension from Calientes, Nev., to Daggett, Cal. Contract for the remaining 45 miles has been let to J. H. Norton. (July 24, p. 548.)

SMITHONIA & NORTHERN.—A charter has been granted this company, with power to build a railroad 20 miles long in the Counties of Oglethorpe and Madison. J. M. Smith, L. E. Green, J. H. Powell and C. W. Johnson, Smithonia, Ga., are interested.

SOUTHERN PACIFIC.—Rights of way are reported secured for the extension from Lacassine, La., to Lake Arthur, 25 miles. Lacassine is about 30 miles east of Lake Charles, and the new line will extend southward to a point, not yet determined, between Lake Charles and New Iberia.

TENNESSEE CENTRAL.—Press reports state that track laying has been completed between Nashville, Tenn., and Ashland City. Grading is 75 per cent. completed between Clarksville and Hopkinsville, 30 miles, and it is stated that the entire line between Nashville and Hopkinsville will be opened for traffic early in the fall. (May 29, p. 384.)

WESTERN IOWA INTERURBAN.—An officer writes that the proposed route of this electric road is from Des Moines through Dallas, Center, Panora and Audubon Counties to Logan, Iowa, 120 miles. Work will be begun shortly. H. H. Pope, Des Moines, is General Manager; J. A. Nash, Audubon, is President, and James Wilson, Des Moines, Chief Engineer. (July 10, p. 520.)

WEST VIRGINIA ROADS.—The Clinton Coal & Coke Company, with principal office at Morgantown, W. Va., is about to build a railroad from Uffington northeast to its mines, a distance of about five miles.

WINDSOR LOCKS R. R.—The State Railroad Commissioners have approved the proposed route of this road, East Granby, Conn., eastward to Windsor Locks, five miles. The new company is a Central New England enterprise. All rights of way are reported secured and work will be begun at once. (See Construction Supplement.)

GENERAL RAILROAD NEWS.

ALTOONA & BEECH CREEK TERMINAL.—The rights and franchises of this company have been sold to J. W. Thatcher, of New York. The road runs from Altoona, Pa., via Kipple to Falling Timber, 18 miles, and connects with the Beech Creek Division of the New York Central.

BATTENKILL R. R.—See Greenwich & Johnsonville below.

BUFFALO & SUSQUEHANNA.—The preliminary estimate of the gross earnings of this company for the fiscal year ending June 30 shows \$1,000,752 as against \$835,748 in 1902, an increase of \$165,004. Operating expenses were \$568,293 as against \$478,479 in 1902, an increase of \$89,814, leaving an increase in net earnings of \$75,190. The surplus in 1902 was \$69,316, and in 1903 was \$139,028.

CAROLINA & NORTHWESTERN.—This company has filed a mortgage with the Standard Trust Company of New York as trustee, to secure \$2,500,000 first mortgage 5 per cent. gold bonds, due 1953. Of this authorized issue, \$1,500,000 will be used for retiring outstanding bonds, and the remaining \$1,000,000 will be used for new extensions, and for cars and engines.

CENTRAL OF GEORGIA.—A dividend of 5 per cent. has been declared on the first income bonds of this company, which is an increase of 2 per cent. over the amount paid in 1902. Five per cent. was paid in 1901, 3½ per cent. in 1900, and 2 per cent. in each of the years 1898 and 1899.

CHICAGO, CINCINNATI & LOUISVILLE.—This company, which was recently formed by the consolidation of the Cincinnati, Richmond & Muncie, and the Cincinnati & Indiana Western, has filed a mortgage to secure an issue of 4½ per cent. 50-year gold bonds. An equipment trust agreement has also been made with the American Loan & Trust Company of Boston, covering 10 consolidation locomotives, 10 ten-wheel locomotives, 20 36-ft. box cars and other miscellaneous cars.

CHICAGO, ROCK ISLAND & PACIFIC.—See Seaboard Air Line below.

CHICAGO GREAT WESTERN.—A decision favorable to this company has recently been granted by Judge Munger, of the United States Court at Omaha, restraining the Union Pacific in its efforts to prevent the use of the Union Pacific bridge across the Missouri River at Omaha by the Chicago Great Western.

GREENWICH & JOHNSONVILLE.—A certificate of consolidation between the Greenwich & Johnsonville and the Battenkill R. R. has been filed with the Secretary of New York State. The former company operates a road between Johnsonville, N. Y., and Greenwich, 12 miles, and the latter has recently completed a line from Greenwich west to Schuylerville, 10 miles. The new company will be known as the Greenwich & Johnsonville Railway Company, with an authorized capital of \$225,000.

LOUISVILLE & NASHVILLE.—Gross earnings of this road for the fiscal year ending June 30 were \$35,449,378, an increase of \$4,737,121 over the preceding year. Operating expenses increased \$3,068,375, leaving an increase in net earnings of \$1,668,746.

MANHATTAN ELEVATED.—The report of this company for the year ending June 30, 1903, shows an increase of 31,327,677 in the number of passengers carried over the number carried in the preceding year. Gross earnings were \$12,208,337, an increase of \$1,542,426. Operating expenses decreased \$57,701, leaving an increase in net earnings of \$513,554.

ST. LOUIS & SAN FRANCISCO.—See Seaboard Air Line below.

ST. LOUIS, EL RENO & WESTERN.—A mortgage has been filed by this company for \$1,200,000, to cover the cost of building the proposed line from Guthrie, Okla. T., to El Reno, 62 miles.

SEABOARD AIR LINE.—A controlling interest in the stock of this company has recently been acquired by the Rock Island-San Francisco interests. For changes in the Board of Voting Trustees and the Board of Trustees, see Elections and Appointments. For other particulars, see editorial columns.